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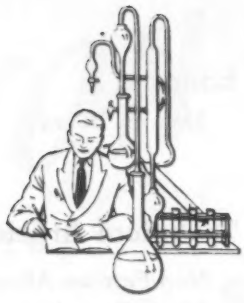

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Men versus Boards

WE have a big job to do, that must be done quickly and well, if we are not to turn millions of workers out of jobs after the war, let alone employ our returning soldiers. That job is the equipment shift and primarily the machine tool shift which is the major part of it.

Few people realize what a big job this is. During the years between 1900 and 1936, the American machine tool industry produced, in 36 years, tools totaling $2.7 billions in value. During the six years of prewar and war preparation and execution ended in 1943 this same industry produced products valued at $4.4 billion.

Some of this productive equipment went abroad but the greater part of it went into American manufacturing plants and is there now turning out munitions. A large part of it is owned by Uncle Sam.

Now Uncle Sam is not going to operate manufacturing plants after the war and munitions making is going to be a very small part of our requirements, we hope. But at present, the government owns approximately 500,000 of our machine tools, representing a total of more than 50 per cent more tools than were in use in this country under private ownership in 1940.

So, if we are to have postwar employment adequate to prevent a disastrous depression, title to these tools must be changed from government, which is not in the manufacturing business, to private enterprise, which is.

Five hundred thousand government owned machine tools at work in war industry do not begin to measure the magnitude of the postwar conversion job because private industry has devoted probably 80 per cent or more of its facilities to war purposes. Nor do 500,000 machine tools mean merely that number of jobs. For every machine tool at work, in normal times, means the employment of at least four additional people, in servicing, maintenance, supervision, transportation, selling and other related services.

The Baruch-Hancock report to the President set forth the urgency of this problem in plain English. In effect it said: "We can't release these tools from war work now, but for God's sake get things ready to do it promptly when the time comes." Well, what was done about it?

Naturally, with an involvement of billions of dollars of tax-payers' money, it was up to Congress to pass an enabling act. But what can you expect in an election year? Even in the face of the appeal by Baruch and Hancock to "hurry, hurry, hurry."

So the President (God bless him in this particular instance) put the job into the capable hands of L. W. Clayton, working through the RFC. And Mr. Clayton, now in charge of all surplus equipment, machine tool and otherwise, has surrounded himself with an extremely capable staff that knows its business.

There are now some twenty-six bills before Congress, most of them with political axes to grind, specifying how surplus equipment shall be sold. And most of them involving the setting up of a board for that purpose.

With few notable exceptions, boards are something that lay around for people to stumble over. A capable man, given authority can move ten times faster and surer than any board which has to meet, discuss, debate, deny, dissertate, dilate and delay.

Yes, Congress should pass the enabling act and specify the terms under which this equipment can be shifted. But it should put the job in the hands of a live man and not an inanimate board.

Save fighters' lives
buy more War Bonds

Mrs. Edward N. Gosselin, mother of Ensign Gosselin, christening the destroyer escort named in honor of her son.

Destroyer Escort Named for Inland Hero

A few weeks ago a sleek destroyer escort vessel slid into the water at the Defoe Shipbuilding Company's yard at Bay City, Michigan. It was the USS Gosselin, named in honor of Ensign Edward W. Gosselin who was killed during the attack on Pearl Harbor. He left Inland Steel Company in October, 1940 to enlist in the U. S. Naval Reserve. His was the first gold star placed on the Inland service flag.

It is interesting and also fitting that Inland steel was used in constructing the USS Gosselin. Since that day of Japanese treachery, Inland has supplied hundreds of thousands of tons of steel for cargo and naval vessels of many types—ships constructed on the Great Lakes, at river yards, and at tidewater.

Inland will continue to produce steel at maximum capacity for the war effort until Victory is ours. We look forward then to helping build the better peacetime world for which our boys are fighting.

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The IRON AGE
August 1, 1944

NEWS FRONT

► The Brassert Company is hiring design engineers to work up plans for a 140,000 to 160,000 ingot ton yearly steel mill for the Corporacion de Fomento de la Produccion, Chile. Since coal is poor there and electricity cheap, the plant likely will be based on electrical energy, with perhaps even an electric "blast furnace".

► That mustard gas may yet be employed against American soldiers in this war is feared by the War Department. Each soldier is being equipped with three head-to-toe cellophane capes as protection against contact with the gas. Each cape is equivalent to 190 cigarette wrappers, which explains the disappearance of such wrappers over recent months.

► The Germans are experimenting with jet-propelled flying mines. Such a unit carrying two magnetic mines recently crashed in South Sweden.

The occasional crashing of crewless jet-propelled bombs in Sweden and Switzerland either indicates experimental steering apparatus going completely awry, or the Germans deliberately are dropping units into a neutral country as a check on their experimental calculations as to range and accuracy.

► Since American pressure has cut into German importations of wolfram from Spain and Portugal, Berlin has announced that an "artificial wolfram" has been devised which is "not quite so good as the real thing".

▲▲ WLB's statement that it is without power to approve union demands to break the Little Steel formula indicates that the entire problem of adjusting the formula will be laid before the President.

If Presidential action is taken to change the formula any single union would be deprived of credit for the upward adjustment.

► American Optical Co. in cooperation with the Apprentice Training Service of the WMC has formulated a program for the re-employment of war veterans. Employment and service records will be examined for ability, education, experience and qualities of leadership. Where improvements have been made in skills, experience and personalities, attempts will be made to fit these men into more responsible positions.

► Declaring that the lack of long range planning in attacking the problem of cutbacks is appalling, Harvey W. Brown, president of the International Association of Machinists, AFL, suggested better coordination between military agencies so that when one branch cancels a contract, another can step into the breach with other work that remains to be done.

Cuts should be concentrated in those companies and areas where the released manpower and facilities can most readily be adapted to other production uses. When cutbacks become most severe, the work week should be lowered to the prewar 40-hr. level.

► Impact of the war on the West Coast has reversed the usual law of industrial growth. Far Western industries find themselves with modern, improved, efficient industrial facilities and a trained working force, but without a sufficient immediate market to continue war sized operations.

Only hiatus in the West Coast postwar pessimism is the hope that Geneva's ownership could pass into private, independent western hands at a sufficient discount to be able to produce competitively, and if railroads grant a low enough rate to the West Coast to deliver finished and semi-finished steel on a roughly competitive basis.

► Shell steel production is expected to hit 450,000 tons per month by Jan. 1, 1945, but shell forging facilities may not be able to handle this tonnage that early. Consequently, tonnage may not develop. Present rate has reached about 200,000 tons and increasing fast. Structural, rail and tube round mill products are suffering from need for rolling capacity for shell billets and bars.

► Out of approximately 1,400,000 jobs and employees in manufacturing industries in states west of the Rockies at present, a loss of half a million is expected for permanent peacetime operation. However, this area is now short 50,000 workers.

► Bomb damaged or mutilated steel landing mats are being treated to "on the spot" rehabilitation. The reconditioning plant is made up of a series of portable units which can straighten and clean bent steel plank landing mats on location. Its relatively light weight and compactness permits it to be flown from one damaged airfield to another.

Non-Ferrous Alloy Blanking Dies

. . . The introduction by the aircraft industry of inexpensive zinc dies has not only revolutionized aircraft practice but also promises new possibilities in, say, automotive production. These dies make possible greater competition by reducing monetary investments in dies and by permitting rapid model changes. In this three-part article, British practice in the use of non-ferrous alloys for aircraft dies is traced from the early use of high strength die casting alloys to the development of K.M. alloy. In addition, tool and die design as well as template production are fully discussed. This article is reproduced by courtesy of Sheet Metal Industries, London.

ONE of the many problems which the aircraft industry has to face when tooling up for a new type machine is the manufacture and supply of the thousands of press tools and blanking dies necessary before it can be put on a production basis. Another factor, which in these times further aggravates the position, is the small margin of time that is available between the issue of component drawings from the design office and the target date set for the commencement of production.

The Bristol Aeroplane Co., Ltd., (Aircraft Division) has, over the past six or seven years, been experimenting with various types of tools with a view to arriving at one which could be speedily manufactured with the minimum number of skilled toolmakers and suitable for operation by unskilled labor.

The introduction of the rubber die technique helped to relieve the strain on the tool room by effecting a change in the design of a considerable number of bending and forming tools (previously produced in steel along conventional lines) to simple type form blocks manufactured from zinc alloy, or one of the many hard wood or synthetic compositions. The company's efforts were subsequently devoted to designing a simplified blanking die which could be standardized to meet the majority of the sizes which would be required. The orthodox type of blanking die, manufactured entirely from cast iron and steel, is obviously costly in manhours and material, particularly with regard to the comparatively small number of pressings which are required for any one type of aircraft.

A tool of this type, such as the one illustrated in Fig. 1, requires very highly skilled toolmakers for its manufacture; it entails the use of very expensive machinery, such as punch shapers, and, in some cases, Keller profiling and die sinking machines as well as the usual tool room equipment like lathes, millers and band sawing machines, and extensive heat treatment equipment. Moreover, a special non-shrinking alloy steel, difficult to obtain under wartime conditions, is used in the manufacture of these dies. Despite the use of this material it is not infrequent for a die to shrink or distort in the hardening process, necessitating the very lengthy operation of stoning out. Furthermore, in the case of very large blanking dies, it is necessary to build up the punch and die in segments to reduce the distortion which takes place when hardening. This method of manufacture demands a high percentage of skilled man hours.

The Bristol Aeroplane Co.'s aircraft division adopted the policy that, unless the required production of any particular part was really high, the conventional type of press tool, illustrated in Fig. 1, would not be a paying proposition. A simpler type of blanking die was therefore developed.

The type decided upon was introduced some two years ago. (See Fig. 2) This blanking die consisted of a bolster made of cast iron with a steel die and mounted with a mild steel stripper plate. The punch was also constructed from die steel and made to fit the aperture of the stripped plate for setting purposes, a simple stop pin being provided for the feeding of the stock. In operation the blank was ejected through the bottom of the bolster.

A range of ten sizes varying from 3 x 4 in. to 15 in. square was designed and these were manufactured in fairly large quantities consisting of the bolster, die and stripper plate, but with the die steel left blank and in its soft state. These standard blank-

For additional data on the use of zinc alloy dies in the aircraft industry, see the following articles in THE IRON AGE:

"Job-Lot Aircraft Stampings," Oct. 19, 1939, *p.* 50; *Oct.* 26, *p.* 43.

"Zinc Alloy Dies for Drop Hammer Work," Feb. 8, 1940, *p.* 29.

"Drawing Dies for Airframe Stampings," May 28, 1942, *p.* 37.

"Stretch-Forming Contoured Sheet Metal Aircraft Parts," June 4, 1942, *p.* 49.

"Forming Convex Flanges and Joggles," June 11, 1942, *p.* 49.

"Coring Kirksite Dies," April 8, 1943, *p.* 84.

"Kirksite Die Casting Technique," June 10, 1943, *p.* 60.

"Steel, Plastics and Zinc Used in Combination Die Set," June 17, 1943, *p.* 68.

"Impression-Cast Chuck Jaws," Aug. 5, 1943, *p.* 54.

"Casting Die Wedges for Light Metal Flanging," Oct. 28, 1943, *p.* 70.

"Mass Production of Kirksite Blanking Dies," Jan. 20, 1944, *p.* 70.

"Production Short Cuts," March 16, 1944, *p.* 73.

"Kirksite Molds for Plastics," April 20, 1944, *p.* 71.

"Cast Kirksite Blanking Dies," May 4, 1944, *p.* 56.

ing die sets were made up in batches by trainee labor. In addition to the standard blanking sets, a range of sandwich type drilling jigs was designed and in order to speed up manufacture of these tools still further, the jig and tool design office prepared drawing sheets, shown in Fig. 3, printed with the outline of these tools. Therefore, whenever the design of a blanking die or drill jig was required, the jig and tool draftsman had only to fill in the developed shape of the part and centers of any holes which might be required, together with the addition of the working dimensions onto the appropriate size drawing sheet, the tool then being ready for ordering. The tool room, on receipt of the tool drawing, obtained from the stores the correct blanking die set which was then passed to the toolmaker for completion. This type of die proved very satisfactory in use and showed considerable saving in the time of skilled toolmakers. It is being extensively used today, particularly where heavy gage metal blanks are required.

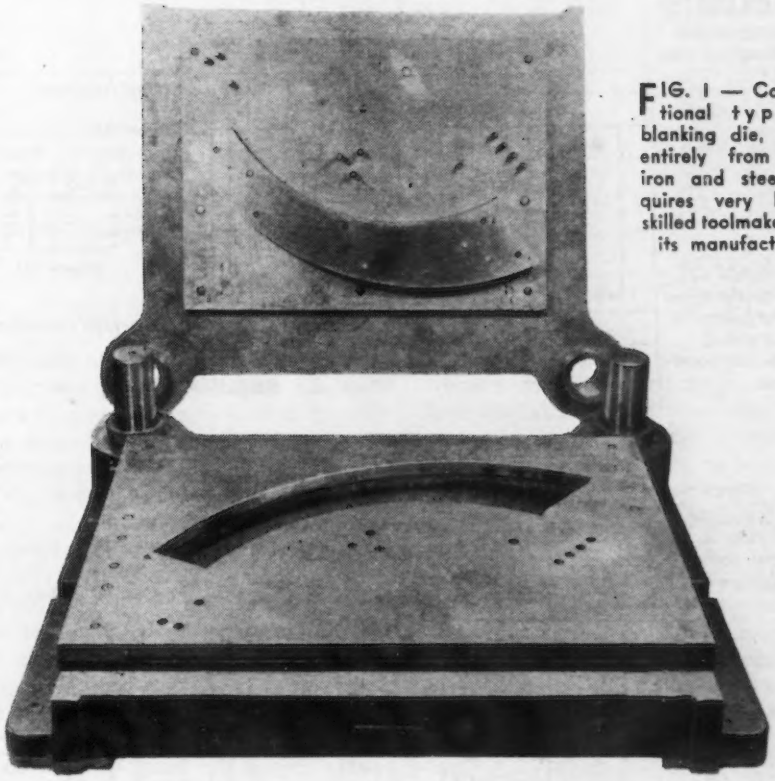

FIG. 1 — Conventional type of blanking die, made entirely from cast iron and steel, requires very highly skilled toolmakers for its manufacture.

Simpler Type of Blanking

The majority of airplane detail parts are manufactured from light alloy sheet and the company felt that an even simpler type of blanking die could be devised. It was in connection with research along these lines that the use of zinc alloy, which was already known to be meeting with considerable success in several American factories, was considered. The zinc alloy used by the American factories is known as Kirksite A, but is difficult to obtain under war conditions in England. As a direct result of the pioneer work of the company, however, a new alloy was developed in conjunction with National Alloys Ltd.* and the Ministry of Aircraft Production. This firm produced five sample alloys in plate form which were submitted to Bristol for research purposes. Blanking dies were made up in each of the five alloys and given considerable runs under production conditions.

Imperial Smelting Corp., Ltd.

The results of these tests far exceeded the company's expectations, the alloy designated as "K.M." proving most satisfactory. The blanks produced from these dies were entirely free from burr and, even after some 2000 had been run off, their quality had not deteriorated. *It would not be an understatement that the quality of these blanks equalled and, in some cases, surpassed those produced from expensive steel dies.*

The K.M. alloy blanking dies showed such a considerable saving in the man hours required for their manufacture as compared with any previous type that this company forthwith adopted their use wherever possible. A detailed description of the design and method of manufacture developed will be given later in this article.

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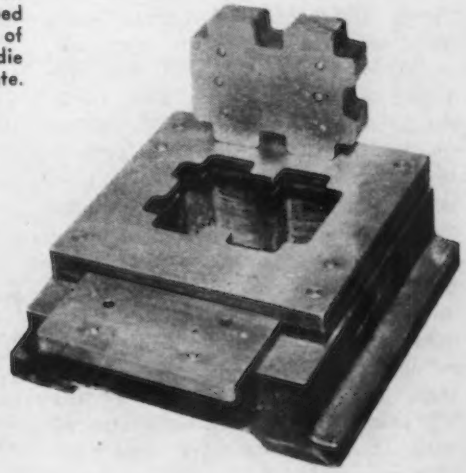
FIG. 2—For limited production runs, the blanking dies shown here were developed about two years ago. The die consists of a bolster made of cast iron with a steel die and is mounted with a steel stripper plate.



Development of K. M. Alloy

The use of zinc alloy in the making of dies for forming sheet metal components was a logical development from the early stages of this work when straight zinc alone was

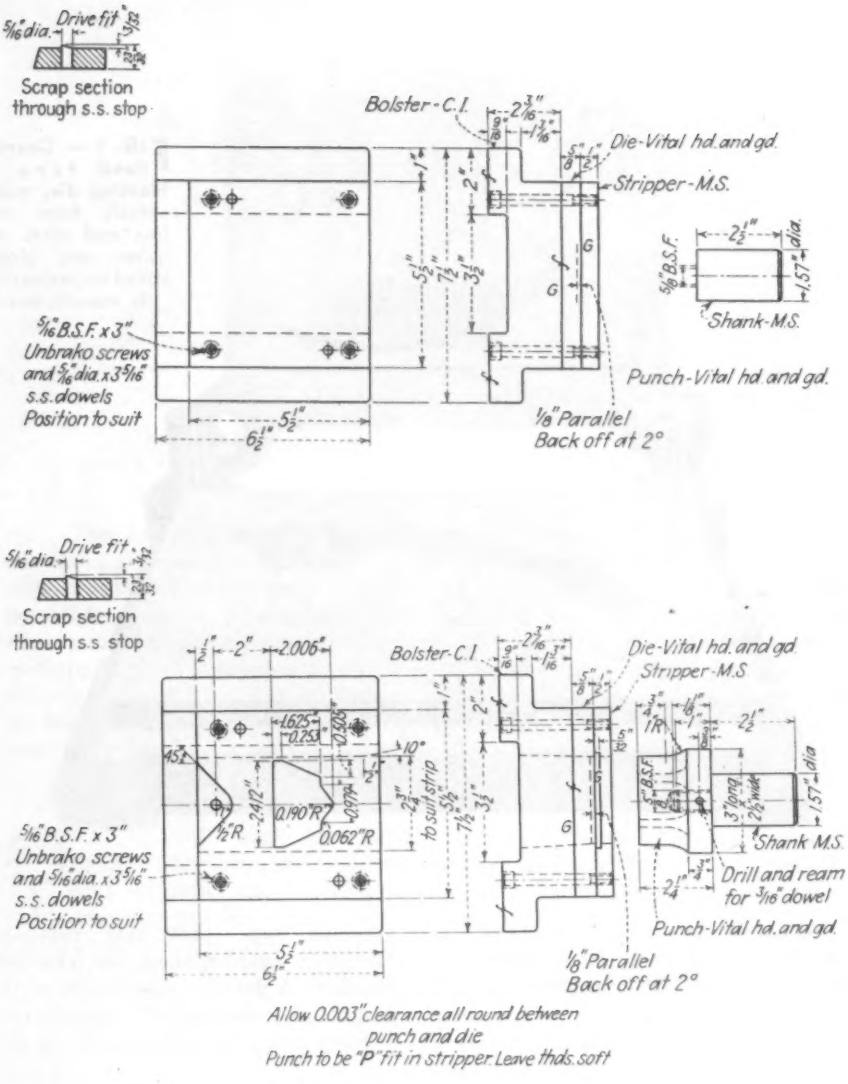


FIG. 3—Standard blanking die drawings. Whenever the design of a blanking die or drill job was required, the draftsman had only to fill in the developed shape of the part and centers of any holes which might be required. Working dimensions were also added.

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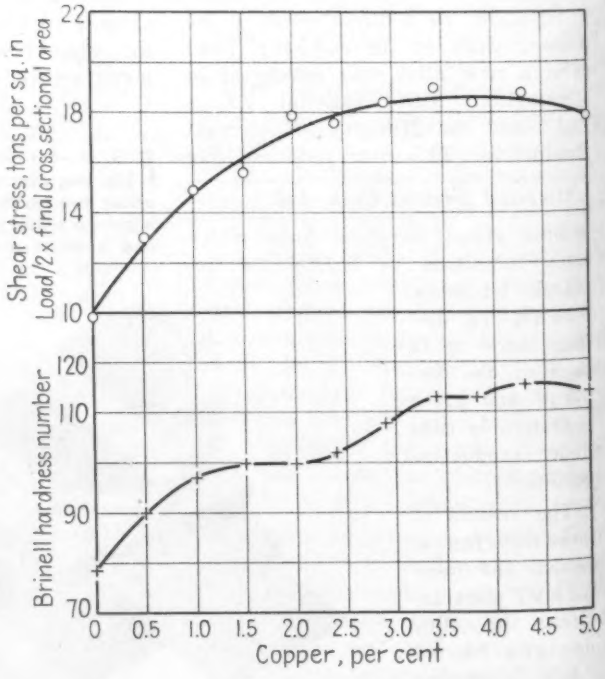


FIG. 4—Effect of copper additions up to 5 per cent on the shear strength in compression and the Brinell hardness of high purity zinc containing 4.1 per cent aluminum and 0.04 per cent magnesium.

the high strength zinc die casting alloys for its die material, manufactured under the name Zamak in the United States and Mazak and Durak in England. These alloys, containing 3.9 to 4.3 per cent aluminum, 0.03 to 0.06 per cent magnesium, and varying quantities of copper, are manufactured from 99.99+ per cent pure zinc, which is an essential requirement in their constitution.

In the United States, a large measure of credit for the adaptation of these alloys to aircraft manufacturers' requirements is due to Morris P. Kirk & Sons, Inc., Los Angeles. This company selected, from the range of Zamak alloys, the alloy Zamak 2 as most nearly satisfying the requirements of the aircraft industry, and for a time manufactured it under the name of Kirksite 2, under license from the New Jersey Zinc Co.* The composition of this alloy, which was also manufactured in England under the name of Mazak 2, was as follows:

	Per Cent
Aluminum	3.9 to 4.3
Copper	2.5 to 2.9
Magnesium	0.02 to 0.05
Zinc, 99.99+	Remainder

Subsequently the Kirk Company modified this composition to obtain greater strength and hardness and introduced a new alloy known as Kirk-

*"*Zinc Alloy Dies for Drop Hammer Work*," by *W. W. Broughton*, THE IRON AGE, *Feb.* 8, 1940.

used. At that time this material was employed for cast drop hammer dies, usually in conjunction with an antimonial lead punch which was cast directly into the zinc die, but experience showed that in the unalloyed state, zinc was not strong enough to withstand the severe stresses imposed. Aircraft manufacturers, therefore, searched for better materials, and for a time an alloy of zinc with 4 per cent copper was used fairly extensively. This alloy, while having distinctly better mechanical properties than unalloyed zinc, was still insufficiently strong for the purposes required and, in addition, was found to suffer from iron "pick-up" when melted in cast iron pots. Copper, as an alloying addition to the zinc alone, does not cause any appreciable grain refinement, consequently large castings slowly cooled tend to be brittle. The properties of this alloy, compared with those of unalloyed zinc, are shown in Table I.

It was not unnatural, therefore, that the aircraft industry turned to

site A, which found immediate favor and has been adopted to a large and increasing extent in the United States for the construction of dies for stretching and blanking operations, as well as for drop hammer work in the fabrication of light alloy panels and sections for aircraft. The graph in Fig. 4 shows the effect upon the shear strength in compression and the Brinell hardness of additions of copper of 0 to 5 per cent to a high purity zinc alloy containing 4.1 per cent aluminum and 0.04 per cent magnesium.

In England some similar developments have occurred. Owing to the heavy call upon the die casting industry for the manufacture of munitions, it was decided early in the war to concentrate on the production of one zinc alloy, namely Mazak 3, a copper-free alloy. Neither Mazak 2 nor Mazak 5, the zinc alloys containing copper, have been produced on a commercial scale during the war. There was, however, in the early days of the war, a limited production of Durak which is one of the Mazak series of alloys and has the same aluminum and magnesium contents as Mazak 2, but contains 1 per cent copper and a trace of manganese. In the early stages of the development of zinc alloys for forming dies, Durak was probably the most frequently used. Subsequently, however, production of Durak had to be suspended owing to shortage of zinc supplies, and accordingly the aircraft industry has until recent months been forced to rely on secondary zinc alloy for its die material.

TABLE I

Properties of Zinc Copper Alloy*

	Zinc (Cast)	Zinc, 4 per cent Copper (Cast)
Tensile strength	3,600 lb. per sq. in.	18,200 lb. per sq. in.
Compressive strength		28,600 lb. per sq. in.
Brinell hardness	31	72

* "Zinc and Its Alloys," 1931, U. S. Bureau of Standards.

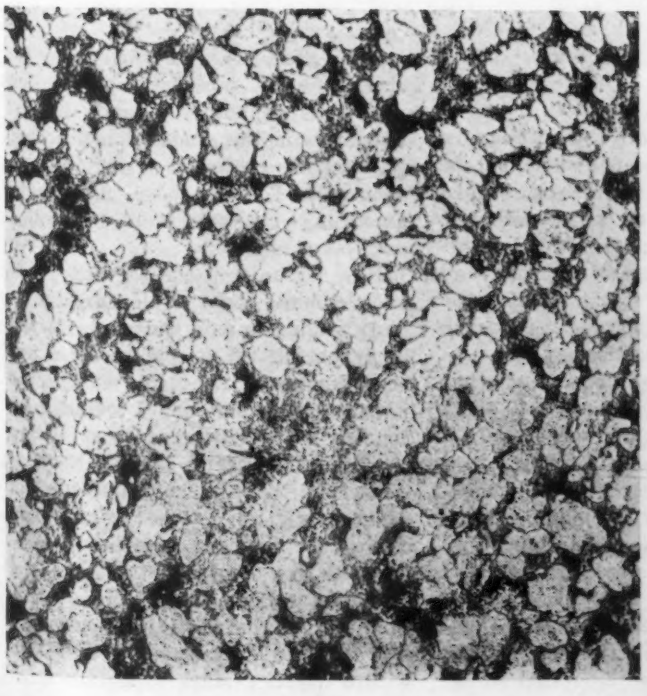
To keep pace with increased uses developed by the aircraft industry, a new alloy is now available, made from virgin materials. This is called K.M. alloy, and is similar in composition to Mazak 2 but the composition has been modified to give additional strength and hardness. The basic zinc is of 99.99+ grade, and the impurities are controlled during manufacture (as with the Mazak alloys) below the following maxima:—

	Per Cent
Lead	0.003
Cadmium	0.003
Iron	0.075
Tin	0.001

The necessity of keeping the low melting point metals, in particular lead, cadmium, and tin, down to extremely small proportions in zinc alloys containing aluminum has been amply described in the literature*. It is sufficient, therefore, to note that the presence of as little as one part in 10,000 of any of these elements will cause intercrystalline corrosion to develop upon aging, particularly in warm, humid atmospheres. This intercrystalline attack is accompanied by swelling, distortion, cracking, and loss of strength and was responsible for the unfavorable reputation gained by the early zinc die casting alloys manufactured before the commercial production of 99.99+ per cent pure zinc. In addition to its role in promoting intercrystalline corrosion, tin, at as small a proportion as 0.007 per

(CONTINUED ON PAGE 132)

*Brauer and Pierce, Transactions A.I.M.E., 1922, 22, 1.

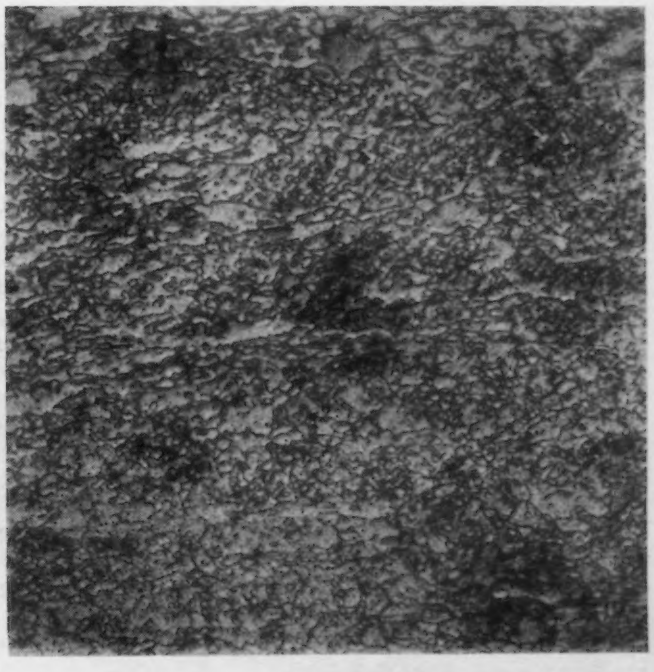


ABOVE

FIG. 5—Microstructure of K.M. alloy as cast. One per cent nital etch, at 100 diameters.

BELOW

FIG. 6—Rolled structure of K.M. alloy, etched in 1 per cent nital, at 980 diameters.



What Quenching Oil to Use

By W. G. FORBES
Tide Water Oil Co., New York

"FOR quenching operations there is no disputing the fact that mineral oils are much more resistant to decomposition and change. This is an important consideration when dealing with a subject that contains so many other variables, many of them classified as phenomena."

THE author's first experience with a prominent metallurgist occurred about 15 years ago, at a time incidentally when he had a job on his hands trying to master the intracacies of the oil business. The metallurgist spoke easily and rapidly about subcritical temperatures, the isothermal transformtion of austenitized carbon steels, S curves, TTT curves, pearlite, sorbite, trootsite and finally he displayed all these things in magnified photographs, hundreds of them, and like finger prints no two were alike. The writer felt like Anthony Leeuwenhock, the famous Dutch janitor, who was the first to build and peer through a microscope. Here was another strange world.

The writer's original purpose had been to try and sell a little mineral oil to accomplish all these things, a simple mineral oil such as might be used to lubricate the bearings of a sewing machine, or a lawn-mower, but I was so overwhelmed by this new world of strange terms and microscopic interpretations that I was ashamed to mention such a foolish idea. When it came time to go I ventured to ask my obliging friend what kind of oil he used to secure all these intriguing results, and there again I was confronted with a first class mystery. "I use three types of quenching oil" replied my friend, "each one has its own peculiar characteristics, they are specially made to meet my requirements and they contain ingredients which enable me to accomplish what you have seen." There was the answer to the whole thing. But this was not my first brush with medicine men, nor my last, and while I felt very discouraged about showing my complete ignorance from the start of this interview to my ignominious departure I made up my mind to add the study of metallurgy to my list of hobbies. But in the meantime I had those mysterious quenching mediums analyzed by a petroleum chemist.

Now let us skip the ensuing years and the many hours of pleasure I have had reading many books on metallurgy, chemistry, petroleum and a few other subjects. Let us also skip the petroleum terms that I could now counter with if I were to meet my metallurgical friend again. For his isothermal transformation curves, I could stack up my viscosity index curves; for his martensite I could ad-lib with my neutralization member, my interfacial tension and my solvent refining. If our contest looked like a draw I could attempt to stump him with a casual remark about the complex metallic additives we now use in certain types of petroleum products of the straight chain type. Anyway,

15 years later, I would at least have a better chance of engaging in a discussion that would not be so completely one sided. I could add my own quota to the babble of confusion.

But here is the strange conclusion I have arrived at, after considerable observation of quenching with oils of many types. And to dispel early some popular misconceptions about quenching oils, let me say that my friend would have been much better off if he had just purchased my sawing machine oil. He might have saved himself many headaches that he did not tell me about, his photomicrographs would probably have been more uniform, and he might have been better able to control his operations. I know this now, because the first of his mysterious quenching mediums was straight refined whale oil, the second was a mixture of mineral oil and fish oil, and the third was a mixture of mineral oil made soluble in water with the aid of a soap compound.

The line-up was by no means unsound, but the manipulation of these three mediums must have required the skill of a top notch juggler. In fact, the Indian rope trick was being carried out before my unsuspecting eyes, and me with a gold brick in my hand that was all the while turning to lead.

Suppose now we agree to set aside all technical terms and examine the subject of quenching. In the first place we do not know what actually causes steel to become hard when heated above a certain "critical" temperature, then plunged into something cold. However, we do have microscopes, cameras, hardness testing machines, etc. to record the before and after effects. With these aids we can find out with reasonable accuracy just what has occurred after the quenching operation. If the steel comes out hard and brittle like a piece of glass the quench has been too rapid; if soft and similar to its original form, the quench has been too slow. In between these phases lies the most desirable result for a particular quenching operation. This is where all the work and study comes in with its endless diagnosing from trial and error work with specimens. This is the headache of the metallurgist, and the reason for his never ending search for a quenching medium that will obligingly go about its business and produce the desired result without a lot of study and fussing. For similar reasons the people of this country purchase three hundred million dollars worth of vitamin tablets every year; the majority do so on the chance that two or three a day will benefit them. Maybe it does. I do not know.

However, I do know that vitamin tablets won't do the trick in quenching oils. Here we are confronted with the problem of cooling a piece of steel in so many seconds to secure a desired result. Water is too fast for most operations, so assuming that oil is decided upon as a cooling medium, the choice ranges over a wide field. Animal and fish oils have a slight edge on mineral oils because their cooling rate is slightly less rapid. But this advantage is soon nullified in actual practice because they decompose and thicken more readily than mineral oils when subjected to heat with the result that the cooling rate changes very noticeably when compared with the same operation using a straight mineral oil. Hence this lack of stability throws a monkey wrench into any continuous quenching operation. This disadvantage is quite apart from any objectionable odors that develop, and the higher cost of animal and fish oils. Plant oils may be ruled out entirely because they oxidize much too easily and have drying properties. If mineral oils are blended with fish or animal oils the tendency towards decomposition is of course lessened pro rata, but the overall advantage becomes negligible. Hence maximum resistance to decomposition is an important factor, and mineral oils exhibit much greater resistance to decomposition than any other type.

The next problem encountered is that of vapor bubbles forming and sticking to the surface of the hot steel. In this connection animal and fish oils have lower surface tensions, hence they are believed to flow or creep over the hot steel better than mineral oils and as a result dislodge these vapor bubbles more readily and make the quench more uniform. This theory has led to considerable research along the lines of endowing mineral oils with this same virtue. It is not hard to accomplish, and many materials have been added that will do this, but the practical results have not substantiated the theory to any noticeable extent.

However, there is another effective and simple method that will dislodge vapor bubbles and that is to circulate the oil. This simple procedure will dislodge vapor bubbles very effectively and the oil need only flow gently in one direction to quickly distort and liberate all the balky vapor bubbles that form on the surface of the steel. Another advantage of circulating the oil is the benefit derived from maintaining the oil at a reasonably uniform temperature.

. . . At the request of THE IRON AGE, the author herein sets forth in provocative language his preference for mineral oils for all types of quenching. Mr. Forbes is the author of two recent text books published by John Wiley & Sons, Inc.: "Lubrication of Industrial and Marine Machinery," and "Lubricants and Cutting Oils for Machine Tools."

The next question is the type of mineral oil best adapted to quenching. In this connection the most popular type is known by the trade name of "28 Paraffin." This is a light oil distilled from paraffin base crudes such as are found in the Pennsylvania and Mid-Continent fields. The viscosity as measured on the Saybolt instrument is approximately 100 sec. at 100 deg. F. The trade name "28 Paraffin" is merely derived from the fact that this type of oil has a gravity reading of 28 or above, when tested with a hydrometer using the gravity scale of the American Petroleum Institute. When the quenching operation is such that considerable mist is raised by the quenching operation, it is common practice to use oils up to a Saybolt viscosity of 200 sec. at 100 deg. F. However, best results are generally secured with the lighter oil.

The temperature of the oil is an important factor in all quenching operations, particularly the maintenance of a uniform temperature. If the temperature of the oil is 40 deg. F. at one time and 180 deg. F. another time there will be some variance in the results. Hence it should be obvious that means must be provided to circulate the oil and maintain the temperature within reasonable limits.

The next question is the best oil temperature for most quenching purposes. From practical experience and many expressions of opinion this temperature appears to be anywhere between 75 deg. F. and 120 deg. F.

Mineral oils, or any other type of oil for that matter, will oxidize and break down with service. The oxidation process causes acidic products to form and the extent of this action may be determined by the test for neutralization number which is

(CONTINUED ON PAGE 136)

Welding and Cutting

THE extensive use of flame cutting and arc welding in quantity production operations has focused the attention of industrial engineers upon means for integrating these processes into production-line techniques. The comparative ease with which cutting and welding can be organized to fit in with a continuous production scheme is becoming better known, now that war production has settled into a smooth, permanent stride, with so much of this work being done by welded fabrication.

The difference between a production-line method of manufacture and the more common system of breakdown of operations is chiefly one of degree. In addition to this quantitative difference, however, there is a qualitative difference. One of the most common methods of manufacturing quantities of an assembly requiring a number of different operations performed in sequence is to do the work in lots or batches. This usually entails repetitive handling, a larger inventory of unfinished work and space for temporary storage at various points throughout the plant. Both costs and manhours per finished piece are usually higher by this method than when an overall procedure approaching a true production line can be set up.

The essential, qualitative difference between the two methods is that with the production line the work unit is one piece rather than a batch of pieces and this one piece is kept in active production from start to finish. At the Globe Co., Chicago, where hatch shifting beams are being fabricated by welding, this method has effected reductions in handling, in the tonnage of steel needed to keep all work stations busy, in the time lapse between start and finish of each beam and in the total working space devoted to the fabrication of this item. In the last analysis it has resulted in an extremely low cost per ton of steel fabricated.

The hatch shifting beams designed by the Globe Co. and its associates are of a new type. They are both lighter and stronger than the straight run of structural mill beams previously used for this purpose. Since their introduction more than a year ago they have become standard equipment on all Liberty and Victory ships. Because of the production methods employed, output of these beams has been so satisfactory that Globe employees have been awarded the Maritime "M".

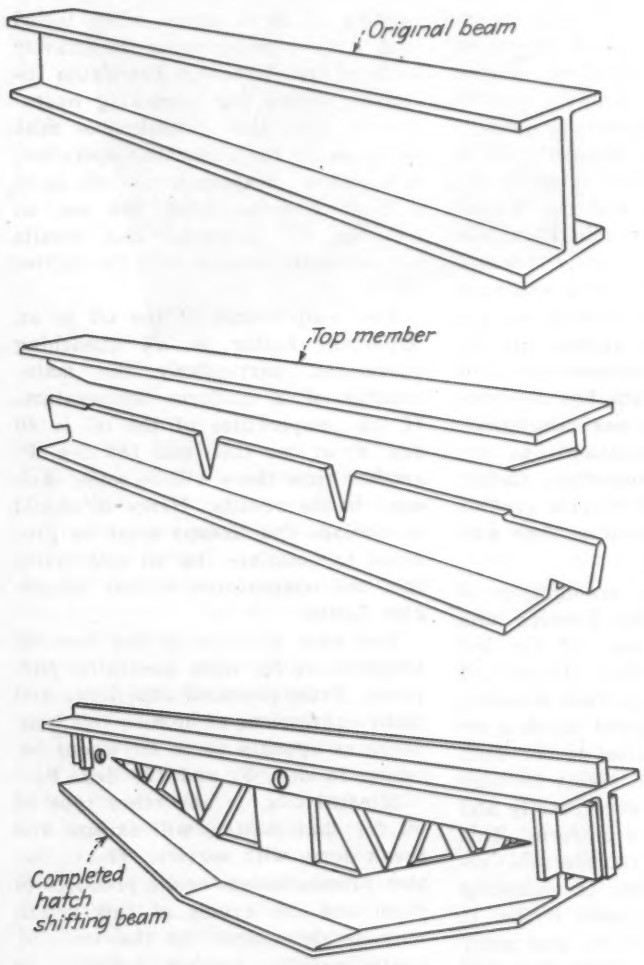


FIG. 1—Transformation of standard I-beam to patented Globe hatch shifting beams. Beam is oxyacetylene flame split longitudinally along the web; ends are flame cut by hand, employing templates; V-notches are flame cut and beveled on welding edges. Parts are then jigged after forming bottom member; struts, plates, angles, etc., welded in, and hatch shifting beam is complete.

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Quick Conversion Made

Prior to setting up for the fabrication of hatch shifting beams and other war work Globe had manufactured machinery for the meat packing industry. Yet in the 28 days following receipt of the first order from the Maritime Commission, the company began making deliveries. In this short period the shops were completely rearranged to accommodate the installation of the essential new equipment and work schedules were laid out which proved effective initially and which, with but few modifications, are still in practice. Progressive integration of techniques along the line have enabled the company to make price reductions to the Maritime Commission since the job began.

Each Liberty ship requires 53 hatch shifting beams, weighing a total of 53,935 lb., which is about 27 per cent or 10 tons less than required in the original design. The Victory ship requires 60 beams totaling 80,220 lb. The new beams (patent pending) were so designed that no changes were required in the ship's hatch structure to accommodate them. Beams for each individual hatch are interchangeable, being made to a length tolerance of

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Adapted to Line Production

By FORREST WALDO
Applied Engineering Department
Air Reduction Sales Co.

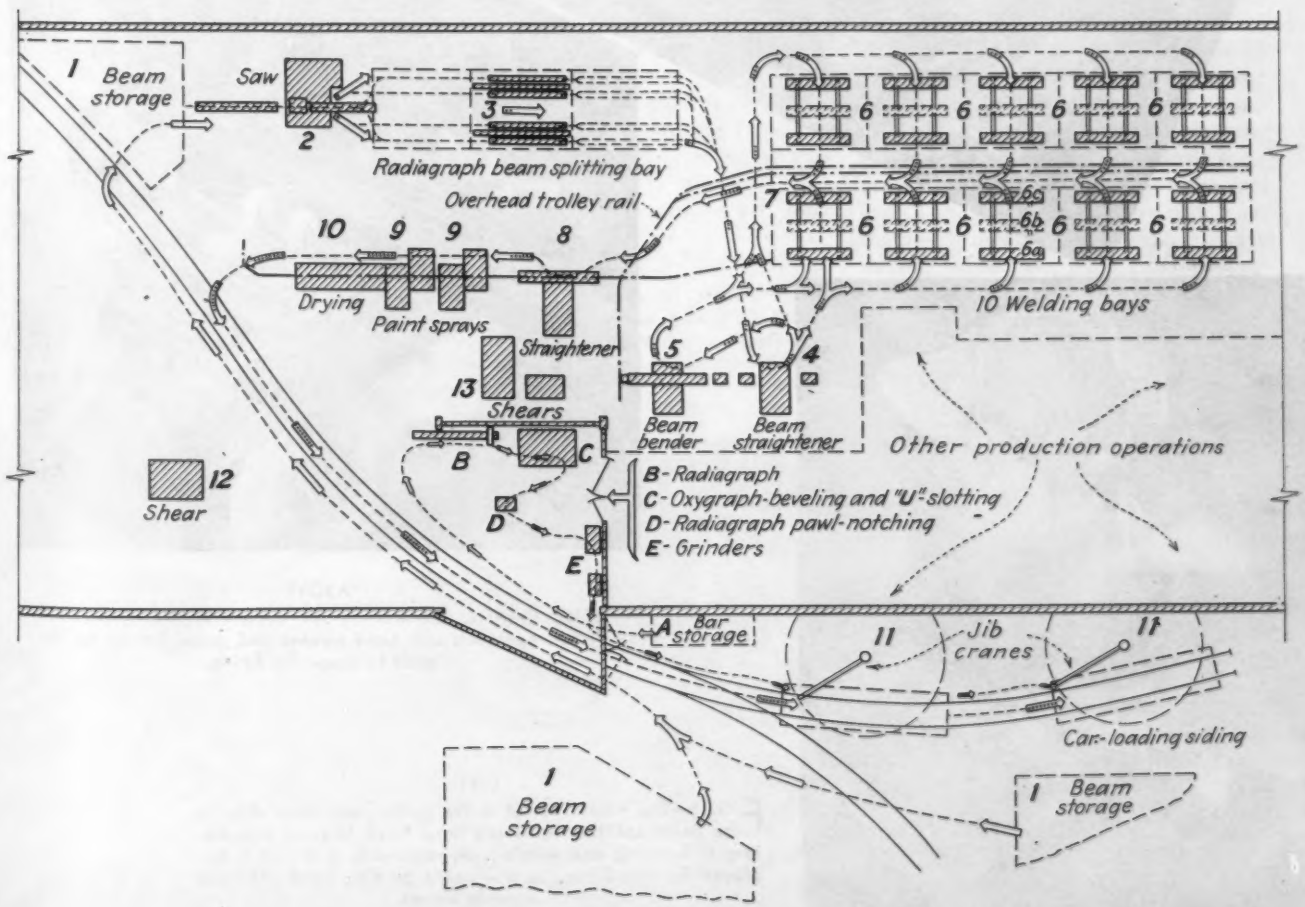
+ 0.25 — 0.000 in. This accuracy was easily possible in beam fabrication, but it became worth while only after mutual cooperation on the part of the Maritime Commission, Globe and the shipbuilders enabled the latter to exercise fine control over the fabrication of the hatch coaming structure into which accurately made beams could be readily fitted.

The diagrams in Fig. 1 show three stages in the conversion of standard 16 in. I-beams to the fabricated type of beam. Fig. 2 is a detailed material flow diagram, with each work station identified by a number which will be referred to in the following step-by-step description of operations on the production line.

. . . At the Globe Co., Chicago, a particularly successful production-line technique has been developed for the welded fabrication of hatch shifting beams for Liberty and Victory ships. Continuous production is so smoothly organized that a monorail conveyor is used to carry the beams from one work station to the next, and as much as possible the performance of each operation is so planned as to minimize or eliminate the possibility of workers getting ahead of schedule or the building up of surplus stocks at any stage of fabrication.

The standard I-beams are received by rail in cars containing 106 beams of different weights, sufficient for fabricating two complete sets of members. A number of these are delivered directly by rail to storage, station 1, within the plant for immediate feeding into the production line. Surplus I-beams are stored in the steel warehouse adjacent to the plant. When needed, these are placed by crane on trucks and wheeled into the plant to

FIG. 2—This production layout indicates the flow of material, beginning at the raw material storage and moving through the production line to the carloading station where the finished product is forwarded to its destination.



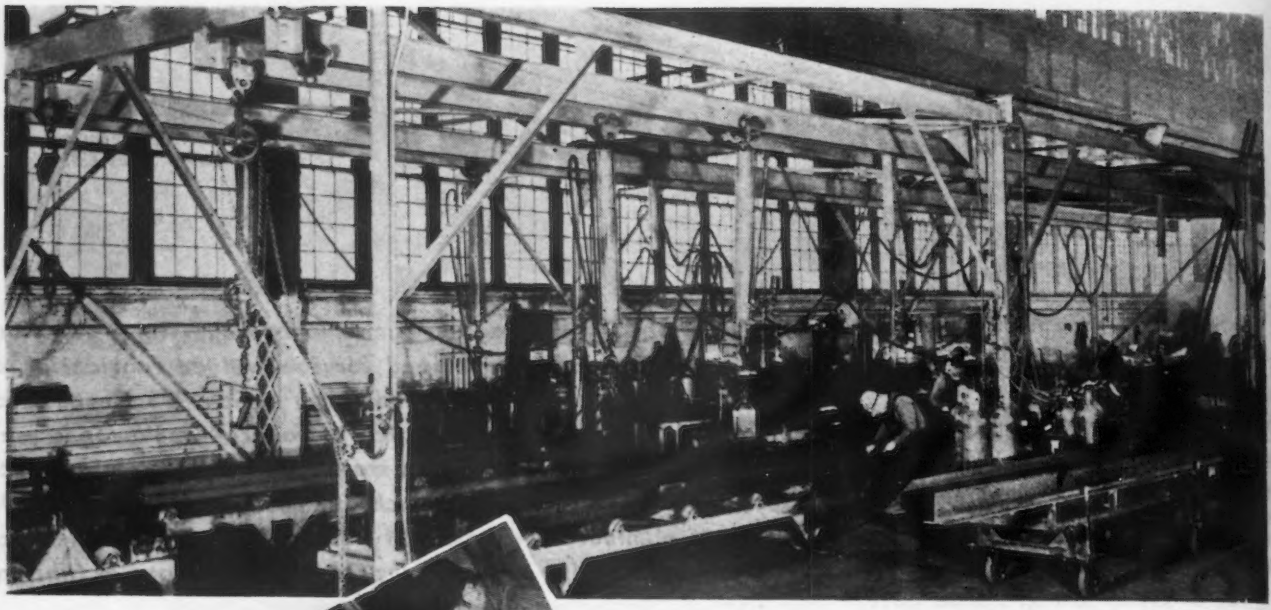


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FIG. 3—The beam splitting bay. Roller conveyors and overhead air hoists feed the beams to jigging tables for longitudinal splitting.

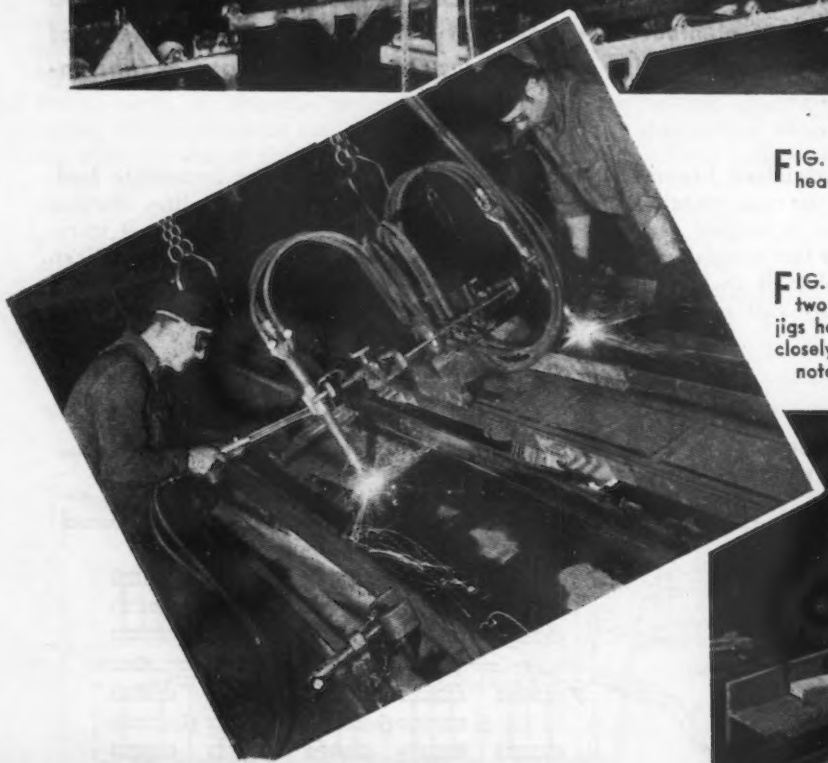

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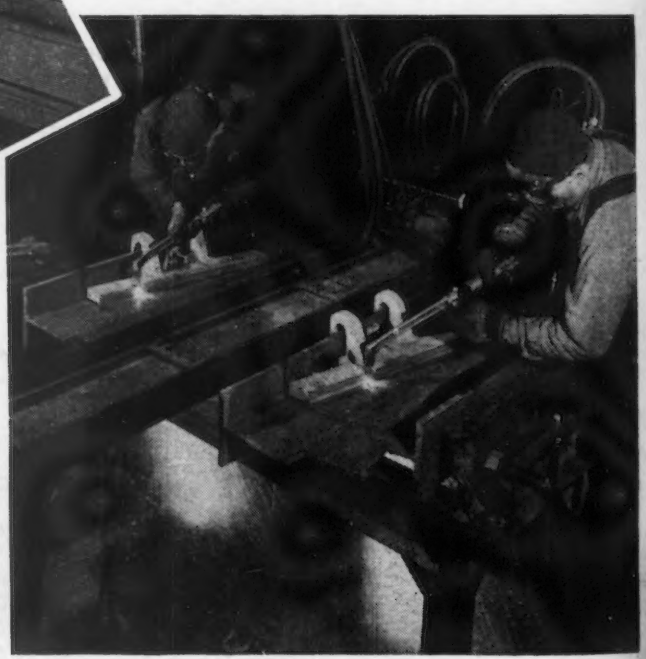
FIG. 4—Beams are split by a single Radiagraph with two torches mounted on a fixed track between two jigs holding beams. Operator with hand torch follows closely behind machine, cutting tapered ends and V-notches in bottom members, using guide fixtures.



ABOVE

FIG. 5—After the Radiagraph completes the longitudinal cut, operators with hand torches and guide fixtures cut the ends to shape for fitting.

LEFT

FIG. 6—The V-notches cut in the bottom members while on the beam splitting table are hand torch beveled preparatory to bending and welding. A removable arm rest is employed for steadying the operator's guiding hand. This job is done in transit.

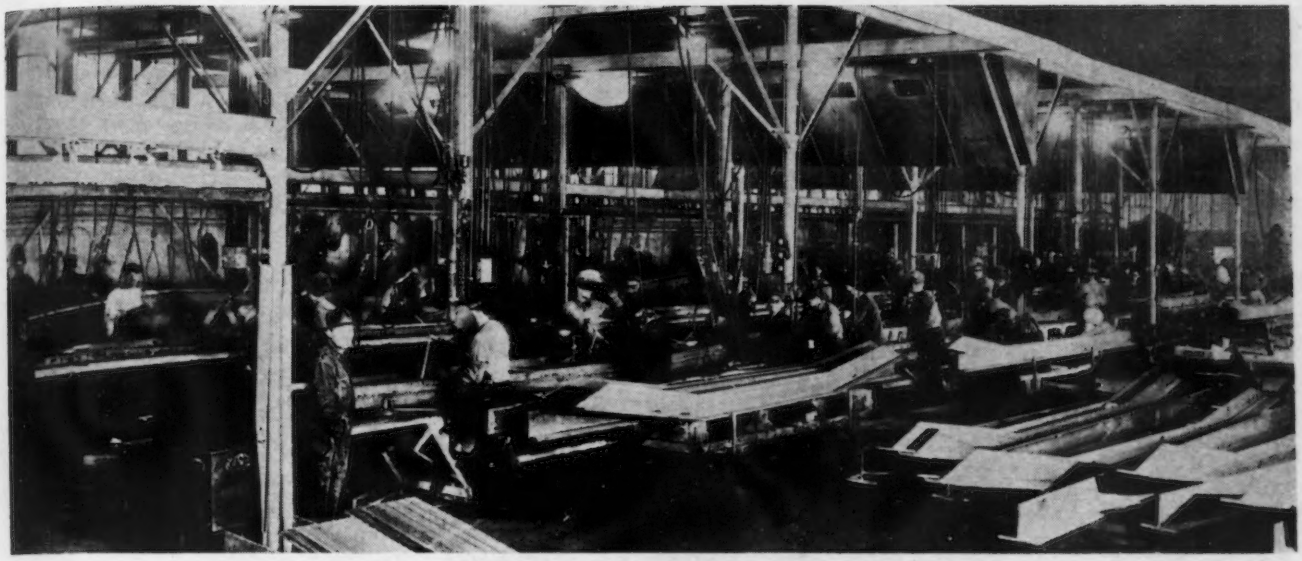


FIG. 7—A general view of the welding area. There are ten bays in this area, each having a jig, cradle, table, overhead conveyor and air hoist. Hand cars deliver parts for two complete hatch shifting beams to each bay.

station 1. More than two carloads of beams are fed into the line each day.

Start of Production

The first step in conversion of the I-beam to the Globe beam takes place when the beam is shifted from the stock pile to a skid rack and then onto a roller conveyor leading to a friction saw. While on the conveyor the beam is scribed for oxyacetylene flame cutting, using templates. It then rolls to the Ryerson friction saw, station 2, where one flange is sawed through and the web is sawed part way through, reducing the top half of the beam to the 19 ft. 11½ in. length required for the upper member as seen in Fig. 1. This operation, which takes only 4 min., is followed by the trimming of the lower flange with an oxyacetylene hand torch, used in conjunction with a guide fixture, to provide an overall length of 20 ft. 5⅞ in. Before leaving this station the beam is marked with its order number and type, and its entry into the production line is recorded.

Here the production line divides into two main streams. The roller conveyor leading from the saw deposits the beam onto one of two conveyor beds, shown in Fig. 3. These beds roll transversely on wheels engaging in tracks fixed to the floor, permitting the beam to be located beneath one or the other of four monorails which will carry it to a cutting table. While on the conveyor bed one end of the top half is cut to shape with a hand torch using a steel guiding template or fixture. Burrs remaining from the sawing operation are removed at this point with pneumatic grinders. The beam is then lifted with an air hoist slung from the overhead monorail and moved along to the Airco Radiagraph beam-splitting fixture table, station 3. There are two of these fixture tables, each served by two monorails and equipped to split two beams simultaneously. Four beams are therefore handled at once by two cutting crews.

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FIG. 8—Close up of station 6a welding jig. Setup men load the jig and lock the members. Welders tack and butt weld all of one side of hatch beam. Beam is then shifted across to cradle.

Splitting the I-Beams

As shown in Fig. 4, each cutting table consists of a Radiagraph track fixed in the center, with positioning stops and clamps on both sides for quick positioning of the beams. The Radiagraph carries two torches, tilted at a leading angle in the direction of travel. With a hand torch, starting holes are first pierced in the beam webs, 1 in. from the end. Machine cutting to split the beams along their centerlines begins at these holes and ends 1 in. from the opposite end, leaving short uncut ties to provide rigidity during subsequent hand cutting operations. These hand cuts are made as soon as the machine has passed the point where each cut is to be made. First, at one end, the web of the top

member is trimmed to a sharp angle. Then, farther along, two narrow Vs are cut in the web of the lower member, to allow for subsequent bending. Then the 1 in. uncut ties are severed and the opposite end of the top web is trimmed to the proper angle, as shown in Fig. 5. Cutting of these web edges which will later be fitted into welded joints. Cleaners with chipping hammers then remove burrs and slag.

Straightening Split Beams

Air hoists quickly swing the members from the truck and into position for straightening on the bulldozer, station 4. This operation is necessary due to the slight distortion caused by the release of rolling strains in the I-beam after beam splitting. The bottom members, after being straightened, are transferred to a second bulldozer, station 5, which serves as a beam bender and forms the bottom member to its truss shape.

Meantime, plate and angles for the struts and center plates of the shifting beam have been cut to shape on the Pel shear at station 12 and have been brought to the bulldozer for straightening. At this juncture, these parts and the beam members are loaded on a truck, so that each truck carries all necessary pieces for two complete hatch shifting beams. This truck is then moved to one of the welding bays at station 6.

Welding Assembly of Beam

The welding area, illustrated in Fig. 7, consists of 10 identical welding bays, five on each side of a center aisle. In each bay are a welding jig at station 6a, a cradle at 6b and a horizontal table at 6c. These are employed in sequence and usually all three are occupied at once by beams in various stages of completion. Welding generators are located overhead on a steel platform which also supports transverse monorail conveyors with pneumatic hoists for shifting the beams from one position to the next. Each welding bay has its own conveyor as well as its own crew consisting of two setup men and four welders.

The parts carrying truck is brought alongside one of the bays, where the setup men use the air hoist to load their jig with a complete set of parts for one beam and clamp them rigidly in position. Welders then tack and butt weld one side of the beam and fillet weld two reinforcing end plates. This activity is shown on the jig in Fig. 8.

By means of the air hoists, the setup men now shift the beam to the first position on the cradle, which con-

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FIG. 9 — In the cradle, the backs of the welds in the web joints are gouged out with a hand torch and gouging tip. After slag is removed a clean groove is exposed for completing the welding.

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RIGHT

FIG. 10 — Upon completion of all welding operations in stations 6a, b and c, the beams are transferred to the welding area center aisle where two overhead monorail lines transfer them to the next station.

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angles and Vs is done with template fixtures to guide the hand torches in making smooth, accurate cuts.

The two halves of the beam are now placed on scarfers' trucks which serve the dual purpose of providing, in effect, worktables for the scarfing operation and conveyance to the bulldozer. The scarfer, using a hand torch and demountable steadyrests as shown in Fig. 6, double-bevels the edges of the two Vs and the portions of the

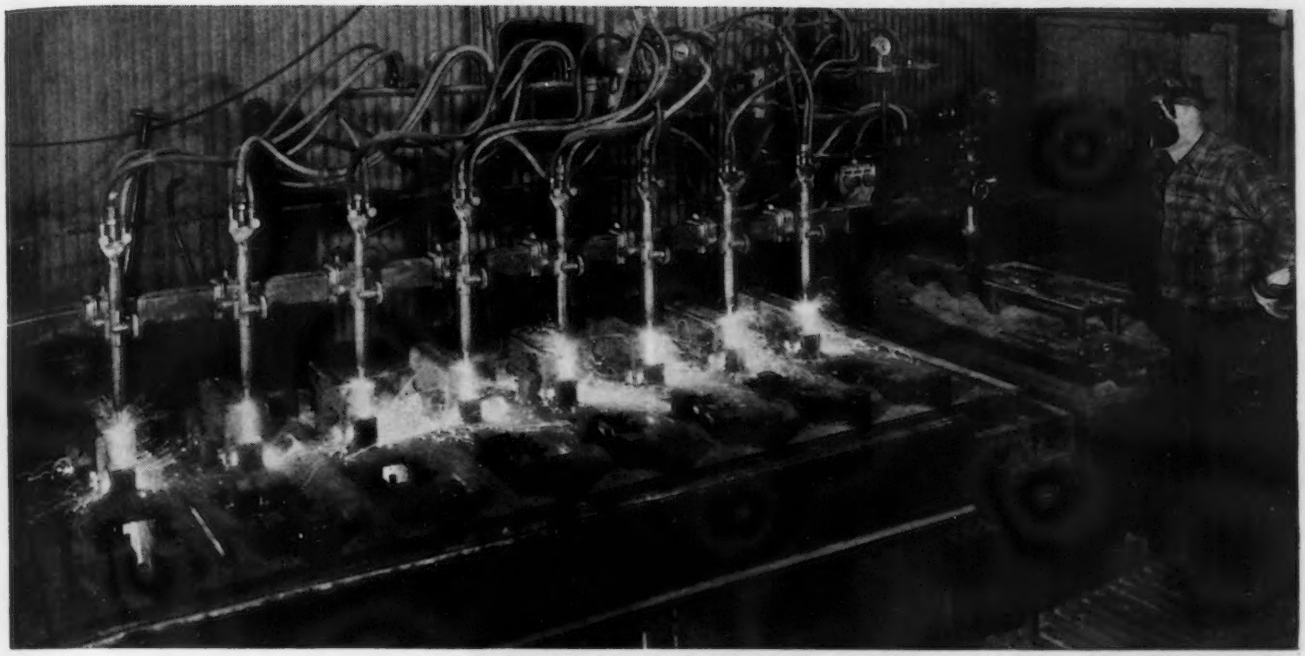

FIG. 12—Beam socket bars are beveled and slotted on this eight-torch Airco Oxygraph, equipped with jigged work table and magnetic cam tracer table. Bevels are cut on rear set of jigs as shown. Eight jigs in front hold bars for slot cutting.

sists of several 90 deg. V-shaped supports, holding the beam at a 45 deg. angle with the unwelded side facing up. Here the ½ by 2½ in. top bar is fillet welded to the top flange. Also the backup of the web joints is gouged free of slag and prepared for welding by means of an oxyacetylene gouging torch, Fig. 9. The beam is then given a quarter turn in the cradle and the welders complete the fillet welding of the top bar.

The setup men then shift the beam to the horizontal table (6c), exposing the incompleted side for welding. After this welding is completed, inspection is made of all welds, the beam is branded and the setup men place it in T-shaped jigs on the center aisle floor, exposing the narrow space between the reinforcing plates at both ends, for fill-in welding.

From the jigs the beams are picked up by overhead conveyor, Fig. 10, and carried down the center aisle and out of the welding area. While suspended by the conveyor the beams receive the final fabrication operations at station 7. These consist of the cutting of 4-in. dia. lifting holes with a hand torch and center point, and the grinding of edges and corners. Weld spatter and slag is removed with chipping hammers. The beam is then finally straightened on the bulldozer at station 8 and inspected for alinement and surface cleanliness preparatory to painting.

Weld Inspection

Located on the assembly line are Magnaflux and X-ray equipment which are used at different intervals to check the quality and penetration of welds. This also gives each welder the opportunity to inspect his own work with his foreman, thus assuring himself that he is doing a proper and efficient job of welding.

Still on the conveyor, the beam is pushed into the first location in the paint spray booth, station 9, where both sides are simultaneously sprayed with one coat of red prime paint. It is then pushed to the second location where it receives a spray of gray finish paint. From this point the beam rolls by conveyor through an infrared drying chamber, station 10, where drying is accomplished in approximately 4 min. As the beam leaves this chamber it is stenciled as to type and destination and moved into position for loading on railroad cars.

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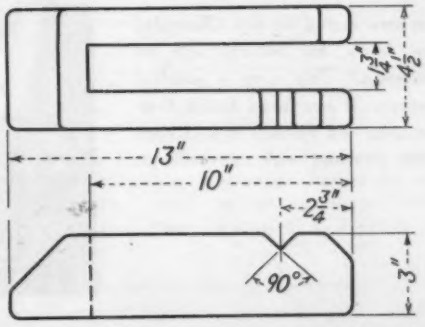
FIG. 11—Liberty ship beam socket. Each beam requires two. Cuts to be made are, in sequence: cut-off, beveling, U-slotting, and notching of 90-deg. V.



In a subdepartment of the Globe Co.'s beam fabrication department the beam sockets are made, two for each beam. These are attached to the inside face of the ship's hatch coaming on port and starboard sides of the hatch, and serve to support, position and lock the beam in place. The Liberty ship beam socket design is shown in Fig. 11. The Victory ship sockets are larger and somewhat different in design.

The sockets are made from hot rolled steel bars 3 in. thick by 4½ in. wide, formed at the mill with a ⅜ in. radius on all four corners, and having a tensile strength of 60,000 to 75,000 lb. per sq. in. Bar stock is stored at station *A*, and once each day sufficient bars for one day's production are trucked into the Radiagraph cut-off unit at station *B*.

This unit handles bars in groups of three, with a two-torch Radiagraph for producing six cut lengths in one operation. An overhead crane hoists the three bars to the cutoff table, where a manual winch positions them against a stop for the first cut. The cutting machine, running at right angles to the bars, carries two torches 13 in. apart and is set to make its cuts 13 and 26 in. from the end of the bar. The cutting of six blanks takes about 3 min., whereupon the winch is again used to bring the remainder of the bars up against the stop. This operation goes on continuously, using the high speed Airco 45 cutting tips to maintain the pace of production.

The blanks are then handled eight at a time on an eight-torch Oxygraph cutting machine, at station *C*. Two

RIGHT

FIG. 14—Finally sockets, locking pawls, bolts and beams are loaded into gondola cars for shipment. The beams are securely braced and retouched when necessary with the hand paint spray gun.

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BELOW

FIG. 13—Pawl-notching of the beam sockets is done on this swinging jig with a Radiagraph. The socket is locked in the swinging jig and the first side of the notch is cut. The jig is then swung 90 deg. and the second notch cut is made.

cutting operations are performed here, and the worktable is fitted with 16 permanent jigs, eight for each operation. The rear set of jigs, shown in Fig. 12, holds the bars in position for beveling, while the front set positions them for cutting the U-shaped slots. Two steel templates are affixed to the tracing table for guiding the torches in making both cuts.

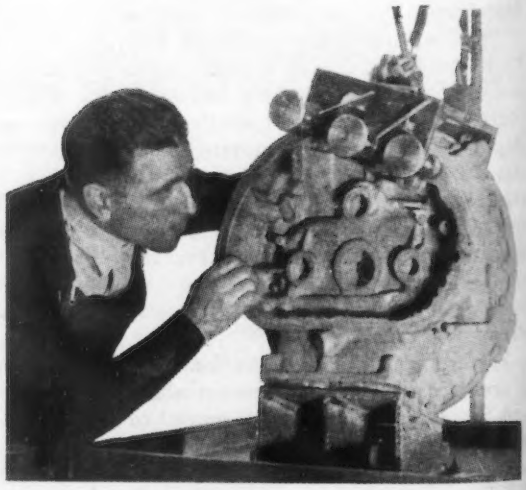
Notching is done by a Radiagraph on fixed track with the workpiece locked in a swinging jig, illustrated in Fig. 13. The V-cut is made by first running the Radiagraph in to cut one leg of the V, and then in one quick sequence of motions, stopping the machine, swinging the jig 90 deg. with the apex of the V as the fulcrum point, and restarting the machine in reverse to cut the other leg of the V-notch.

Each socket is then checked with a gage for slot width and notch depth and location. After final inspection of dimensions, grinding and cleanliness, the sockets are sent to station 11 where they are loaded on railroad cars. Sockets, pawls, bolts, washers, etc., for 53 beams are placed in the bottom of the cars, and the beams are then loaded on with a jib crane, Fig. 14. They are braced and, if necessary, retouched with a paint spray gun, then sent on to their destination.

As demonstrated by the foregoing description, fabrication of hatch shifting beams at the Globe Co. is done with a minimum of lost movement and time. The rather profuse use of fixtures, cradles, and jigs, as well as such lesser devices as guides and arm rests for hand torch cutting, not only indicate but prove the potentialities of production-line planning in welded fabrication.

Soap Test for Magnesium Castings

Magnesium castings having drilled oil passages are tested at the Chevrolet Transmission and Magnesium Foundry, Saginaw, Mich., for leakage with an auto oil soap called "Karfoam—a soapless shampoo." This soap is painted directly on the casting where leakage might occur. It has been found that 75 lb. per sq. in. air pressure with this waterless soap will disclose a leak that it would have required 250 lb. per sq. in. water pressure with conventional testing methods.



Stainless Steel and Magnesium Pickling

. . . Special pickling problems arising from the individual characteristics of stainless steel and magnesium are herein discussed. Operational sequences and unit installations are also described.

STAINLESS steel pickling presents a special problem because the scale which contains high percentages of chromium oxides, is not readily attacked by sulphuric acid alone.

The usual procedure is to subject the parts to a precleaning operation for the removal of grease, oils and other surface dirt. This precleaning operation may be either sand blasting, vapor degreasing or alkaline cleaning. In some cases the process is to subject the parts to a light, superficial sand blast, followed by pickling. After precleaning, the parts will then be pickled, rinsed, passivated and final rinsed.

Pickling solutions vary, depending on the strength, temperature of the solutions, and the character of the scale involved. The common practice for stainless steels is to employ a mixture of about 10 per cent sulphuric acid with 2 to 10 per cent muriatic acid. Another type of solution is hydrochloric acid, 50 per cent solution by weight at a 130 to 140 deg. F. Solutions of hydrofluoric acid and nitric acid are also used.

Typical Pickle Solutions

	Per Cent by Volume
Hydrofluoric	1 to 3
Nitric	10 to 20
Temperature	Room
Sulphuric	6
Hydrochloric	4
Temperature	135 deg. F.

Operating solutions at higher temperatures accelerates the pickling action. However, the upkeep and maintenance of tank linings, required to hold hot pickling solutions, becomes such an item of expense that it does not warrant the use of this type of solution. After pickling, the parts must be rinsed in clear water that may be either hot or cold.

Parts may be subjected to a passivating or bright dip solution following the pickle. This solution is generally composed of nitric acid, 15 to 20 per cent by volume, and maintained at a temperature of 130 deg. to 150 deg. F. The parts should be emersed in this solution for a period of 20 to 30 min.

Passivating does not affect the appearance of a polished surface and it is good practice to passivate corrosion resisting steel after machining, fabrication or severe handling, since it restores corrosion resistance by accelerating the formation of the oxide surface film. After passivating, the parts should be thoroughly rinsed in hot or cold clear water.

The stainless steel pickling unit, if possible, should be installed in the processing department and in close proximity to fabrication and other using departments.

All units of installation should be placed in a line so that if production permits, a single monorail or crane will serve all tanks.

If precleaning facilities are already available, the pickling unit should be installed in the vicinity of this equipment, thereby eliminating the expenditure for such equipment.

Sufficient area should be provided prior to and following the pickling installation, to allow for material and parts handling.

All acid tanks should be adequately exhausted and it is good practice to install the pickle unit in a pit extending about 3 ft. on all sides of the unit. This type of installation will, in the event of tank breakage, confine the solutions within the pit, preventing them from flooding the department and causing serious damage. Instead of installing two rinse tanks, installation costs may be reduced by installing between the pickle tank and the passivate tank, a single spray type, free draining rinse tank. This tank can be used for the rinsing operation of both pickling and passivating.

Magnesium Pickling

Magnesium alloys are quite resistant to corrosion under ordinary urban and rural exposure. However, in heavy industrial areas and particularly along the sea coast, corrosion becomes pronounced. To offset this corrosive action, magnesium parts are subjected to pickling processes. These processes vary depending upon the characteristics of the material or alloys. The two most generally used pickling processes are chrome pickle, and the Dow No. 7 treatment. These two treatments are most widely used in the aircraft industries.

In the chrome pickle treatment, the operations consist of precleaning by either vapor degreasing or alkaline cleaning, followed by the chrome pickle and a clear water rinse.

The Dow No. 7 treatment includes precleaning by either vapor degreasing, or alkaline cleaning, followed by a hydrofluoric acid solution pickle, clear water rinse, dichromate pickle and final rinse.

In most cases in the aircraft industry the precleaning is done by means of a vapor degreaser. However, it is satisfactory to use an approved alkaline cleaner. In some cases where oxide coatings are not completely re-

(CONCLUDED ON PAGE 138)

• • • This article is the second of a series based on the Lockheed Aircraft Corp.'s survey on "Process and Paint" which was conducted under the auspices of the Methods Improvement Panel of the Aircraft War Production Council. The first article was entitled "Cleaning Aircraft Parts" and appeared last week. "Protective Coatings for Aircraft Parts" and "Plating Practices of the Aircraft Industry" will appear shortly.

Guide to Furnace Selection

By D. H. GARDNER
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THE purpose of this article is to enable a plant not familiar with industrial furnace equipment to find quickly the type of gas or oil-fired furnace best suited to a job. This guide is also intended to assist in determining the heating time required, the heating medium to be used, and from these, the type of furnace best suited for a particular heat treating operation with regard for the production required and the weight and size of the material to be heated.

While all the recommendations herein deal with equipment made by the Stewart Industrial Furnace Division, the range is so wide as to make the guide general enough to cover most competitive equipment.

The purpose of the heat treatment of metals is to give them new qualities of hardness or toughness by causing the molecular structure of the metal to change. This is done by heating the metal at the proper temperature, for the necessary time, followed by quenching or controlled cooling. This complete cycle of heating and cooling must be determined by the new physical properties required, and by the chemical analysis of the metal.

The chart herein and the accompanying discussions deal with the three major factors to be considered. These are, (a) what does the furnace have to do?, (b) what production schedule must be met?, and (c) will special atmosphere or liquid heating media do the job best?

(A) What Does the Furnace Have to Do?

(1) *Aging (Precipitation heat treatment) aluminum and magnesium alloys:* This operation is an artificial aging or precipitation of the alloy or strengthening compounds, requiring only hours instead of days, and is carried out in a temperature range of approximately 300 deg. to 400 deg. F.

(2) *Annealing aluminum and magnesium alloys:* This operation is used to soften aluminum alloys after cold working or hardening, and consists of heating to just above the recrystallization temperature, approximately 650 deg. to 800 deg. F. The temperature used depends on whether the original work was hardened or heat treated for other physical characteristics, the degree of softness required, and the particular alloy. The annealing operation is followed by slow cooling down to at least 450 deg. to 500 deg. F.

(3) *Annealing copper, copper alloys, brass, bronze, etc.:* The major heat treating operation for these alloys is process annealing, which consists of heating to required temperature and quenching in water or cooling slowly. The temperature range depends upon the degree of softening required, which usually corresponds to a predetermined grain size. The usual temperature range is from 600 deg. to 1250 deg. F., depending on the material.

(4) *Annealing steel:* This operation consists of uniformly heating the work above the critical range, followed by the slow cooling, usually in the furnace, although occasionally packed in some semi-insulating medium, such as lime, ashes, etc. Steel is annealed to soften it for easier machinability, or to relieve stresses, or to refine the grain structure. Complete annealing requires soaking the work at the annealing temperature for a long enough time to completely homogenize the internal crystalline structure. Most annealing of steel is done in a temperature range of 1400 deg. to 1700 deg. F.

(5) *Brazing (with copper):* This process consists of joining steel parts by melting copper at the joint. This work must be done at the high temperature necessary to melt the copper (approximately 2100 deg. F.) and in a protective atmosphere to prevent the formation of oxide at the joint, which would prevent the bonding between the copper and steel.

(6) *Blueing:* This process consists of dipping steel in a molten bath of special blueing salts to give the steel a blue oxide coating for surface protection and appearance. The temperature range for this work is approximately 300 deg. to 800 deg. F.

(7) *Bright annealing steel:* This operation is similar to annealing, except that the work is heated and cooled in a special non-scaling protective atmosphere, which results in work with a bright, clean finish, ordinarily requiring no pickling or cleaning operation (providing the work is clean and bright before it is put in the furnace).

(8) *Carburizing steel:* This operation consists of heating the steel above the critical range in contact with or packed in a carbonaceous material, such as charcoal, bonechar, liquid carburizers, special gas atmospheres, etc., causing the absorption of carbon in the outer surface of the work. The depth of the carbon absorption is approximately proportional to the temperature and time, although the case depth will also vary with the particular carburizer used. Usually carburizing is followed by one or more hardening and tempering operations to obtain the required physical properties of both the hard case

and relatively ductile but tough core. The usual temperature range for carburizing is approximately 1600 deg. to 1850 deg. F.

(9) *Cyaniding steel:* This operation consists of heating steel in a molten bath of cyanide, causing the absorption of carbon and nitrogen in the outer surface of the steel for case or surface hardening. As in carburizing, the case depth is proportional to time and temperature, and varies with the particular salt used. However, since the absorption is limited, case depths are thin. The work is usually quenched immediately upon being removed from the cyanide bath, followed by drawing or similar heat treating. Cyaniding temperatures are approximately from 1500 deg. to 1650 deg. F.

(10) *Differential hardening:* The term "differential hardening" is sometimes used to refer to the hardening of only projecting ends or sections of the work rather than the entire piece.

(11) *Forming and forging aluminum alloys:* Many aluminum alloy shapes require hot forming or forging. This is done in a temperature range of approximately 400 deg. to 980 deg. F., depending on the degree of plasticity required and the particular alloy.

(12) *Forming and forging steel:* These operations involve bringing the work to such a temperature that it is in a plastic state and can easily be formed or forged. It is usually desirable to perform these operations at as low a temperature as possible, consistent with satisfactory die life and easy workability. Accordingly, forming operations on work such as plates, structural shapes, bars, etc., are done at temperatures from 1600 deg. to 1900 deg. F. For larger pieces, such as billets, and for forging, where considerable plastic flow is required, working temperatures are higher—approximately 1900 deg. to 2400 deg. F.

(13) *Galvanizing:* Coating iron or steel articles by dipping in a molten bath of zinc. For satisfactory results, the work has to be cleaned and coated with flux prior to galvanizing. The temperature range for this work is approximately 850 deg. to 880 deg. F.

(14) *Hardening steel:* This consists of uniformly heating steel approximately 25 deg. to 75 deg. above its critical range (approximately 1450 deg. to 1650 deg. F. for carbon steels, 1800 deg. to 2400 deg. F. for the higher alloy and high speed steels), and quenching or cooling rapidly in oil, water, brine air (for air hardening steels), or similar cooling medium.

Hardening carbon steels: Although annealing, normalizing, carburizing, forging, and miscellaneous heat treating operations are done to some extent in most shops, the major heat treating operation is the "hardening" of carbon steels. Ordinarily this consists of three operations: Hardening, quenching, and tempering. This last operation, tempering, is sometimes overlooked in selecting equipment, but is extremely important in order to get maximum toughness, long tool life, and to relieve hardening strains so that the heat treated work will not be brittle and crack or break easily.

As it is necessary to quench the work immediately after it is brought up to heat, and as tempering should be done immediately after quenching, two furnaces are needed—one furnace to heat for hardening, usually operating in a temperature range of 1400 deg. to 1800 deg., and the second furnace for the tempering operation, usually 300 deg. to 800 deg. It is also necessary to provide at least two quenching tanks, one for brine or water and one for oil, to handle the many varieties of carbon and low alloy steels now used.

Hardening high speed steels: In many shops the "hardening" of high speed and high alloy steels is a second major heat treating operation. Usually the correct hardening temperature for these steels is from 1800 deg. to 2400 deg. F. Because there is a likelihood of cracking or damaging the work if it is placed directly in a furnace at this high temperature, it is ordinarily necessary to preheat the work in furnaces operating around 1400 deg. to 1600 deg. Accordingly, as these operations of preheating, hardening, quenching and tempering are all done practically simultaneously, it is necessary to have three furnaces—one for the preheat operation to operate around 1400 deg. to 1600 deg., one for the hardening operation to operate around 1800 deg. to 2400 deg., and one for the tempering operation which for these steels must operate up to 1200 deg. Oil and water quench tanks must also be provided.

The equipment for hardening carbon steels can also be used as part of the equipment for "hardening" high speed steels, the preheat operation, and tempering (if the tempering unit is provided with sufficient temperature range). An additional furnace for the high temperature, 1800 deg. to 2400 deg., however, is required for the final hardening of these high speed steels and high alloy steels.

"High speed steel" furnaces: Furnaces operating in this high temperature range for hardening these steels are commonly known as "high speed steel" or "high speed" furnaces. Fundamentally these are identical with the furnaces used in the lower temperature range, 1400 deg. to 1800 deg. F., for carbon steels, except for having more burner capacity and silicon carbide hearth and supports to withstand the higher temperatures. As most work made of high speed steel and similar alloys is rather small, and as the actual heating time at the high temperatures is relatively short compared to the heating time in the preheating furnace, these furnaces are usually the smaller sizes of standard semi-muffle ovens.

(15) *Melting non-ferrous metals:* This operation covers two different classes of work—melting the low temperature melting alloys, such as lead, babbitt battery metal, solder, etc., and melting the higher melting-temperature metals and alloys, such as brass, bronze, copper, nickel, etc. Except in cases where the metal attacks the pot, the low melting metals can be melted in ordinary cast iron or steel pots. However, the use of a graphite crucible or similar higher refactory container is required for the high melting temperature metals. Temperatures for the two classes of work run approximately 200 deg. to 1250 deg. F. in the low temperature range, and 1250 deg. to 2400 deg. F. for the high temperature range.

(16) *Normalizing steel:* This operation is similar to annealing except that the cooling is done in still air producing a coarser structure more easily machined than annealed steel, although not as soft.

(17) *Soldering with hard solder:* This operation is similar to copper brazing, except lower melting solders are used enabling the soldering of non-ferrous metals and joining of steel parts without the use of special atmosphere. As the temperature range is lower, molten salt baths are sometimes used in place of special controlled atmosphere furnaces. The temperature range is approximately 1000 deg. to 1400 deg. F.

(18) *Solution heat treating aluminum and magnesium alloys:* This operation consists of heating to 700 deg. to 980 deg. F. followed by an immediate air or water quench (heating temperature and quenching medium determined by particular alloy involved). This homogenizes the alloying or strengthening compounds, in the crystalline alloy structure, resulting in a more ductile type of material. In aluminum alloys, these alloy compounds, after heat treatment, precipitate on ageing and increase in tensile strength, but greatly decrease the

ductility. Magnesium alloys require an ageing heat treatment (see paragraph 1).

(19) *Spheroidizing steel:* This operation is a variation of annealing, and results in an internal crystalline structure with a spheroidal form of the iron carbides instead of the laminar (or pearlitic) structure of annealed or normalized work. This spheroidal structure is softer than the laminated type, and is obtained by prolonged heating at temperature just below, or alternately within and slightly below the lower critical temperature, followed by slow cooling.

(20) *Stress relieving steel:* This process usually consists of heating just below the critical range, followed by slow cooling to relieve stresses and strains induced by welding and similar operations. The temperatures for this operation usually range from 1000 deg. to 1300 deg. F.

(21) *Tempering steel:* This operation consists of reheating, after hardening and quenching, to some temperature below the lower limit of the critical range, in order to relieve hardening strains and stresses, and to toughen and soften the steel to the required physical properties. Tempering should be done as soon as possible after hardening, but only after work has cooled until it can be handled with bare hands. Ordinarily hardness decreases and toughness increases with higher drawing temperatures.

(22) *Tinning:* Coating iron or steel articles by dipping in molten tin. In many tinning operations it is sometimes necessary to follow the primary dip with a second dip to assure the necessary even coating. The temperature range for the operation is approximately 500 deg. to 600 deg. F.

(B) What Production Schedule Must Be Met?

Continuous, large scale production: In selecting a type of furnace for the basic heating operation involved, it is necessary, for the lowest first cost and lowest cost of operation and maintenance, to select the type of furnace inherently suited to the production schedule required. For production schedules requiring continuous or semi-continuous production in large quantities or tonnages, special units of the types required—either already designed, or engineered to meet the particular problem — are usually selected. As not only a detailed knowledge of production requirements, but also of the metallurgical factors and

Furnace Selection Guide

(To select size of unit to meet specific requirements refer to section entitled "What Production Schedule Must Be Met?")

(A) What Does the Furnace Have To Do?	(B) What Production Schedule Must Be Met?	(C) Special Atmosphere or Liquid Heating Media?	Type of Furnace Recommended
(1) Aging (precipitation heat treatment) aluminum and magnesium alloys	Continuous		Conveyor air recirculating furnace Pusher air recirculating furnace Car type air recirculating furnace
	Batch: (a) Quantity Production		Basket type air recirculating furnace Oven type air recirculating furnace Box type air recirculating furnace
	(b) Light production	Salt	Round pot furnace Rectangular pot furnace
(2) Annealing aluminum and magnesium alloys	Continuous		Conveyor air recirculating furnace Pusher air recirculating furnace
	Batch: (a) Quantity Production		Car type air recirculating furnace Oven type air recirculating furnace Box type air recirculating furnace
(3) Annealing copper, copper alloys, brass, bronze, etc.	(b) Light production	Salt	Rectangular pot furnace Round pot furnace
(4) Annealing steel normalizing steel spheroidizing steel (see also operation 7.)	Continuous		Conveyor furnace Pusher furnace Rotary hearth furnace Shaker hearth furnace Car type furnace
	Batch	For special atmosphere For lead or salts	Semi-muffle oven furnace Full muffle oven furnace Vertical muffle oven furnace Round pot furnace* Rectangular pot furnace*
(5) Brazing (with copper)	Continuous	Special atmosphere	Conveyor atmosphere controlled furnace Pusher atmosphere controlled furnace
	Batch	Special atmosphere	Special full muffle atmosphere controlled furnace
(6) Blueing steel	Batch	Salt	Round pot furnaces Rectangular pot furnace
(7) Bright annealing steel (also copper brass, etc.)	Continuous	Special atmosphere	Conveyor atmosphere controlled furnace Pusher atmosphere controlled furnace
	Batch	Special atmosphere	Special full muffle oven atmosphere controlled furnace
(8) Carburizing steel (box carburizing)	Continuous		Pusher furnace
	Batch		Car type furnace Semi-muffle oven furnace
(9) Cyaniding steel (or liquid carburizing)		Cyanide, special salt	Round pot furnaces
(10) Differential hardening steel (see operation 14 hardening steel*)			
(11) Forming and forging aluminum alloys	Continuous		Conveyor air recirculating furnace Pusher air recirculating furnace Car type recirculating furnace
	Batch: Quantity production		Oven type air recirculating furnace Box type air recirculating furnace
(12) Forming and forging steels (steel, brass, copper, etc.)	Continuous: (a) Slugs, billets		Rotary hearth furnace
	(b) Billets		Pusher type furnace
	Batch: (a) End or center heating or slugs		Open slot furnace
	(b) Large billets, heavy forgings, plates, structural steel shapes, rods, bars, etc.		Oven type, direct fired furnace
(13) Galvanizing	Continuous		Rectangular galvanizing settings
	Batch		Galvanizing pot furnaces
(14) Hardening steel (also see corresponding operation 14)	Continuous		Conveyor furnace Pusher furnace Rotary hearth furnace Shaker hearth furnace Car type furnace
	Batch	For special atmospheres For lead, salt, or cyanide	Semi-muffle oven furnace Full muffle oven furnace Vertical muffle oven furnace Round pot furnace Rectangular pot furnace*
(15) Melting non-ferrous metals	Batch: Metal melting from 400 deg. to 1250 deg. F; lead, babbitt, battery, metal, etc.		Soft metal melting, pot type furnace
	Batch: Metal melting from 1250 deg. to 2400 deg. F; brass, copper, bronze, nickel magnesium, aluminum, etc.		Tilting type crucible furnaces Stationary type crucible furnaces
(16) Normalizing steels (see operation 4)			

Furnace Selection Guide

(To select size of unit to meet specific requirements refer to section entitled "What Production Schedule Must Be Met?")

(A) What Does the Furnace Have To Do?	(B) What Production Schedule Must Be Met?	(C) Special Atmosphere or Liquid Heating Media?	Type of Furnace Recommended
(17) Soldering (with hard solder)	Continuous	Special atmosphere	Conveyor atmosphere controlled furnace Pusher atmosphere controlled furnace
	Batch	Special atmosphere	Special full muffle atmosphere controlled furnace
		Salt	Round pot furnace Rectangular pot furnace Brazing table
(18) Solution heat treating aluminum and magnesium alloys	Continuous		Conveyor air recirculating Pusher air recirculating
	Batch: (a) Large quantity		Car type air recirculating Basket type air recirculating furnace Box type air recirculating Oven type air recirculating
	(b) Small quantity	Salt	Round pot furnace Rectangular pot furnace
(19) Spheroidizing steel (see operation 4)			
(20) Stress relieving steel	Continuous		Conveyor air recirculating furnace Pusher air recirculating furnace
	Batch		Car type air recirculating furnace
(21) Tempering or drawing steel	Continuous		Conveyor air recirculating furnace Conveyor furnace Pusher air recirculating furnace Pusher furnace
	Batch: (a) Large quantity		Car type air recirculating furnace Basket air recirculating furnace Box air recirculating furnace Oven air recirculating furnace
	(b) Small quantity	For oil, salt, lead	Round pot furnace Rectangular pot furnace
(22) Tinning	Continuous		Large rectangular tinning furnace
	Batch		Rectangular tinning pot furnaces

* For small parts, differential or end heating.

experience with modern industrial furnace practice is involved the selection of these special units is best made after consultation with manufacturers' engineers.

Batch or limited production: Where limited or occasional production is the requirement, batch operation is usually preferred. The type of furnace is, accordingly, determined by the shape of the work and most desirable handling method. For these furnaces it is usually possible to select a suitable size considering three factors.

(1) Heating capacity of the furnace.

(2) The heating time per piece.

(3) The shape and weight per piece.

To determine (1) *the heating capacity of furnaces* in pounds of steel per hour brought up to the temperature given, the following is recommended practice:

[a] *Semi-muffle underfired furnaces* as used for annealing, normalizing, carburizing, etc., operating at 1400 deg. F. or over, have a capacity of 40 lb. of steel per hr. for each sq. ft. of hearth area; for precision hardening, the capacity is 35 lb. per sq. ft.

[b] *Direct fired furnaces* such as used for forging and forming have a capacity of 60 to 80 lb. of steel per hr. for each sq. ft. of hearth area.

[c] *Pot furnaces for salt or cyanide hardening* at temperatures above 1400 deg. F., have a capacity of 30 to 45 lb. per hr. per cu. ft.

[d] *Pot furnaces for lead hardening* at 1400 deg. F. or higher, have a capacity up to 150 to 200 lb. per cu. ft. At 800 deg. F., heating capacities are approximately half of these rates.

[e] *Pot furnaces using oil* for drawing or tempering in a temperature range of 250 to 1250 deg. F., have a capacity of 25 to 30 lb. of steel heated per hr. per cu. ft. of pot volume.

[f] *Galvanizing and tinning furnaces* have a capacity of approximately 25 to 30 lb. of steel heated per hr. per cu. ft. of pot volume.

[g] *Air recirculating tempering ovens* have a capacity of 25 to 30 lb. of steel heated per hr. for each sq. ft. of hearth area.

[h] *Air recirculating basket type furnaces* have a capacity of 60 to 80 lb. of steel heated per hr. per cu. ft. of furnace volume.

NOTE: *Important*—All of the above heating capacities are approximately twice as great for brass; two-and-one-half times for copper; and 0.7 times for alloy steels. These rates are gross heating capacities and include any necessary baskets, trays, containers or fixtures for holding the work. If these are used, furnace heating capacities must be provided not only for the weight of the work but also for the weight of these containers, baskets, etc.

It is important that for best efficiency and long refractory life, the furnaces are not operated over their normal capacities.

To determine (2) *the heating time per piece* the following rates are recommended:

(Most steel manufacturers recommend a soaking period after steel is up to temperature depending on size of thickest section. This soaking time is not included in the following rates and should be determined before selecting size of furnace, as this soaking time must be added to the heating time to determine the total heating time.)

[a] *Forging and forming:* The time allowance should be approximately 8 to 12 min. per in. of section on billets up to 3 in. in diameter when heating at 1800 deg. to 2400 deg. F.

[b] *Hardening high speed steels:* The time allowance should be approximately 4 to 6 min. per in. of section for the final high heat at 2000 deg. to 2400 deg. F. (For preheating, figure as in No. 3 following.)

[c] *Hardening, annealing and normalizing:* The time allowance is approximately 20 min. per in. of section at 1300 deg. to 1800 deg. F., for rounds or squares; 30 to 40 min. for flat plates.

[d] *Tempering, stress relieving, etc.:* The time allowance in air recirculating or oil baths in the temperature range of 250 deg. to 1300 deg. F., is 20 min. per in. of section for rounds and squares, 30 to 40 min. per in. of thickness for plates.

To determine (3) *Allowance for shape, size, and weight per piece:* With bulky work or intricate shapes it may not always be possible to load the furnace to obtain the desired heating rate or to realize the furnace's maximum heating capacity. It is, therefore, of major importance to check the available hearth area or furnace volume to be sure ample space is provided for the required work volume. This is particularly important when soaking time is required, as the soaking time reduces the available production time and furnace heating capacity per hour accordingly.

It is also necessary to check the hearth loading to be sure the hearth is not overloaded by heavy pieces or excessive piling of work. Ordinarily, underfired furnaces operating about 1600 deg. will stand a uniform

hearth loading of approximately 100 per sq. ft.; (direct fired forges, most car types, etc.) approximately 250 per sq. ft. Heavier loadings may mean special hearth design, alloy hearth plates, etc.

(C) Are Special Atmospheres or Liquid Heating Media Required?

IN the selection of industrial furnaces, the possible advantages of using special atmospheres, lead, salt, cyanide, oil baths, etc., must be considered.

In general *special atmospheres* are used where sufficient production and clean work to eliminate the pickling or cleaning operation justify the additional investment in atmosphere generating equipment and special furnace construction. These atmospheres must be generated externally, usually by means for controlling the combustion or cracking of uniformly proportioned mixtures of gas and air. Means must also be provided for removing any harmful constituents of the resulting products of combustion —such as carbon dioxide and water vapor, which tends to decarburize or oxidize steel; sulphur, which tends to discolor certain alloy steels; and soot, tar, etc., which may discolor the work.

Provision must be made in furnaces using special atmosphere to prevent the products of combustion of the furnace proper from coming in contact with the work or with the special atmosphere. This protection is usually obtained by an alloy muffle around the work chamber (full muffle construction) or, by alloy tubes in which the furnace heating gases are burned (radiant tube construction). These special atmospheres are required in bright annealing, and are particularly valuable in clean hardening, annealing of copper, brass, etc. Special atmospheres are occasionally required in the heat treatment of particular types of aluminum or magnesium.

Heating in *molten lead baths* is a very rapid method of heating, and is also desirable for differential hardening of small parts. The heating range of molten lead is approximately 650 deg. to 1700 deg. F. Lead oxidizes readily and should be protected with a covering of charcoal. Lead is usually higher in first cost than liquid heating mediums, but its lower consumption generally results in lower ultimate cost. Steel floats on lead and provision must be made for holding the work down in the bath.

Heating in *molten salt baths* is also very desirable for differential hardening of small parts. Because of the adhering film of the salt when the work is removed, which is easily cleaned, heating in salt results in a very clean finish. Salt baths have a temperature range of from 350 deg. to 2350 deg. F. Some salts may attack the work or furnace pots unless carefully adjusted chemically. There is also considerable loss by "dragout" or dripping loss of the salt adhering to the work, which adds to the cost of operation. Because of the close control and uniform heating inherent with salt baths, and their comparative inertness, they are quite often used for the solution heat treating of aluminum and magnesium.

Heating in *molten cyanide baths* is required for cyaniding—which gives very hard but thin cases on further heat treating (caused by the absorption and increase in carbon and nitrogen). Heating in cyanide is sometimes used as a substitute for heating in molten salt when the parts are small and the heating time very short so that no objectionable case is formed.

Tempering in oil baths is a common and desirable practice for small lots of work where the cost of the air recirculating type furnace is not justified. Although the work has to be cleaned after using oil baths, in this, as in all molten or liquid baths, close control of temperature and uniformity of heating is an inherent and valuable characteristic. The maximum temperature range is limited by the flash point of the oil which is usually considered to be approximately 500 deg. F.

Temperature Ranges and Limitations

GAS fired industrial furnaces are ordinarily supplied for temperatures from 350 deg. to 2500 deg. F. However, with standard burner equipment a furnace will ordinarily only operate satisfactorily over a 500 deg. to 600 deg. F. temperature range. Wider operating temperature ranges can be obtained with special burners or double burner and manifold arrangements at increased cost. At temperatures below red heat, 1100 deg. to 1200 deg. F., direct or indirect gas fired furnaces usually require forced circulation either by fan or extra air jets as at the lower temperature, heating is by conduction and convection and the high heating rate of radiant heat is not available.

On other than specially designed units for large scale production, oil fired industrial furnaces are supplied for temperatures from approximately 900 deg. to 2500 deg. F. At temperatures below approximately 900 deg. F., the control of oil burners does not usually meet the required temperature uniformity. With standard oil burners the operating temperature range is approximately 500 deg. to 600 deg. F. Wider ranges are available only by special furnace design at greatly increased cost.

Although most industrial furnaces can be used for many of the basic heat treating operations, they are limited by their temperature range and their design. Satisfactory results cannot usually be obtained when furnaces are not the right type or not designed for the temperatures required.

Such operations as annealing, carburizing, normalizing, hardening carbon steels and preheating high speed or alloy steels can usually be done in the same unit. However, as the temperatures for tempering are considerably lower and as a different construction is required for temperature uniformity, a separate unit is desirable.

Cyaniding requires a pot type furnace and should not be attempted in an oven type furnace or pot furnace designed for low temperatures. This is particularly important as the fumes of molten cyanide or salts rapidly attack and ruin the refractory.

Forging and forming operations, and high speed steel hardening require higher temperatures and should not be attempted in furnaces designed for low temperature work.

For most other heating operations such as tinning, galvanizing, brazing, etc., the furnaces are designed especially for these specialized operations involved and are not adaptable to other heating operations.

Fuels and Air Requirements

Fuels: Standard industrial furnaces are available for all common gas and oil fuels; however, it is necessary to specify the type and B.t.u. of the gas, or grade of oil, as gas burn-

(CONCLUDED ON PAGE 138)

Influence of Alloying Elements In Cr-Ni-Mo Steel

. . . In this report by V. M. Doronin, which appeared in the Russian magazine Stal, No. 1-2, 1943, data are developed to show the influence of the alloying elements on the mechanical properties of a chrome-nickel-molybdenum steel, corresponding to the American SAE X4340 grade.

INVESTIGATIONS were made into a steel corresponding approximately to SAE X4340 (Russian specification AE 84) which is alloyed as follows: C 0.35 to 0.45 per cent, Cr 0.60 to 0.90, Ni 1.25 to 1.75, Mo 0.15 to 0.25, Si 0.17 to 0.37, Mn 0.40 to 0.80, P 0.30 max., and S 0.030 max.

The steel, after oil quenching from 850 deg. C. (1526 deg. F.) and tempering, should have an ultimate tensile strength of 143,000 lb. per sq. in. minimum, an elongation of 12 per cent minimum, and a reduction in area 55 per cent minimum.

The data of 263 controlled experimental heats were statistically evaluated, and the samples for the experiment were taken from a forged round billet of 120 mm. (4¾ in.) diameter. The sample was taken at the half radius of the billet.

A number of these 16 mm. (⅝ in.) diameter samples were quenched after hardening, bundled together, forming a round of 120 mm. (4¾ in.) diameter. This procedure facilitated the further preparation of the samples and at the same time simulated the conditions existing in the 120 mm. (4¾ in.) billet in quenching. The heat treatment consisted of an oil quench from 850 deg. C. (1526 deg. F.) and air tempering at 580 deg. to 640 deg. C. (1076 deg. to 1184 deg. F.). The tempering temperature was adjusted so as to obtain the mechanical characteristics as specified.

In Table I are given average chemical compositions and mechanical properties of the 263 heats.

The influence of the elements on the heat stability of the hardened steel (SAE X4340) was studied by calculating and adjusting the tempering temperature, by studying the average mechanical properties and the average chemical compositions of the constituent alloying elements.

In order to attain the specified mechanical properties the tempering temperature must be adjusted to the precise chemical composition, as shown in Fig. 1.

The influence of manganese is not clear, since the curve does not express any function. All the other elements definitely increase the heat stability of the steel. The greatest influence on the heat stability of the steel, and thereby on the tempering temperature adjustment, is exerted by carbon. Therefore, the tempering temperature must first of all be based on the carbon content and then corrected for the other elements contained in the alloy. Generally when the alloy content of a steel is increased, the tempering temperature must also be increased according to Table II.

When the elements deviate but little chemically from the average specification, any adjustment can be neglected. But when there is a noticeable deviation and especially when several elements, exerting a similar influence, are at variance with the standard, their combined effect must not be neglected. If C is constant, the maximum tempering temperature interval will be 37 deg. C. (100 deg. F.) between the maximum and minimum contents of the other elements in this alloy steel. (See Table II). If carbon is included in the calculation, this difference will be about 75 deg. C. (167 deg. F.) if the mechanical properties are to be kept constant.

This result is obtained by taking the upper and lower limits of the tempering temperature for maximum and minimum composition of each element, the average of which is given in Table I. Corresponding tempering temperature changes are given in Table III.

On the basis of these data the lower and upper limits of the tempering temperature range can be established:

Lower limit: 611 deg. C. (1132 deg.

TABLE I
Average Data for 263 Heats

CHEMICAL COMPOSITION, PER CENT								MECHANICAL PROPERTIES				
C	Cr	Ni	Mo	Si	Mn	P	TEMPERING TEMPERATURE, 1131 Deg. F.	Tensile Strength, Lb. Per Sq. In.	Elongation, Per Cent	Reduction in Area, Per Cent	Impact Strength, Ft.-Lb. Per Sq. Cm.	H_B
0.40	0.80	1.51	0.23	0.28	0.55	0.015		159,000	15.0	58.6	85.34	315

TABLE II

Effect of Variations in Chemical Composition of the Steel on Tempering Temperature

Element	Per Cent Change in Element	Change in Tempering Temperature, Deg. F.	Max.-Min. Content of Element in Steel	Total Change in Tempering Temperature in Deg. F. for Each Element
C	0.01	7	0.10	70
Mo	0.01	13	0.10	13
P	0.01	9	0.03	27
Si	0.01	3.5	0.20	7
Cr	0.01	3.5	0.30	10.5
Ni	0.01	2	0.50	10
Total Maximum Change	....	....	....	77

TABLE III

Tempering Temperature Changes By Deviations From Average Chemical Composition

Element	Minimum-Average Content, Per Cent	Change in Tempering Temperature, Deg. F. (—)	Maximum-Average Content, Per Cent	Change in Tempering Temperature, Deg. F. (+)
C	0.05	36.0	0.05	36.0
Mo	0.08	10.0	0.02	2.5
P	0.015	13.5	0.012	13.5
Si	0.10	3.5	0.10	3.5
Cr	0.20	7.0	0.10	3.5
Ni	0.25	4.0	0.25	4.0

TABLE IV

Specific Influence of Alloying Elements on Mechanical Properties of Steel SAE X4340

Element Per Cent Increase in Steel	CHANGE IN MECHANICAL PROPERTIES				
	Tensile Strength, Lb. Per Sq. In.	Elongation, Per Cent	Reduction in Area, Per Cent	Impact Strength, Ft.-Lb. Per Sq. Cm.	Brinell Hardness
0.01 C	+ 426	—0.1	—0.9	—1.45	+2.0
0.1 Mo	+2844	0	0	0	+4.0
0.1 Si	+2418	—0.7	—2.2	—3.61	+2.5
0.1 Mn	+ 711	—0.2	—1.3	—1.45	+3.5
0.1 Ni	+ 426	—0.1	—0.6	—1.45	+2.0
0.1 Cr	+ 284	—0.4	—2.1	—2.17	+3.0
0.01 P	+2133	0	0	0	+3.0

TABLE V

Equivalent Quantities of Various Alloying Elements According To Their Influence on the Tensile Properties of Steel SAE X4340

C	Mo	Si	Mn	Ni	Cr	P
0.01	0.015	0.02	0.06	0.10	0.15	0.002

F.) — 41.5 deg. C. (75 deg. F.) = 569.5 deg. C. (1057 deg. F.).

Upper limit: 611 deg. C. (1132 deg. F.) + 35.0 deg. C. (63 deg. F.) = 646 deg. C. (1195 deg. F.).

Therefore, the tempering temperature range for steel SAE X4340 will be in practice between 570 deg. C. (1058 deg. F.) and 645 deg. C. (1195 deg. F.).

The mechanical properties of the steel and the influence of the various elements were investigated after tempering the samples at the constant temperature of 595 deg. C. (1103 deg. F.). In this manner 120 samples were tested.

In Fig. 2 are summarized the data given in Tables IV and V. The results given in Table IV were calculated at the average chemical composition of the steel, the sign plus or minus shows that the elements are either higher or lower than the standard. The influence of C or P is based on an accuracy of 0.01 and of the other elements of 0.1.

Conclusions

(1) The influence of the nonmetals carbon and silicon has been shown in Tables I, II and III. These elements increase the tensile strength of the steel and lower its toughness. At first sight the results obtained with Cr, Ni and Mn, as shown in Table IV, seem to contradict earlier work, as in this steel under the specified heat treatment the alloying metals also seem to increase the strength of the steel and to lower its toughness. However, this contradiction is only superficial.

Steel SAE X4340, as all chrome-nickel steels, is inclined to temper brittleness, and under the specified heat treating conditions (cooling in air after tempering of the test piece assembly) the temper-brittleness of the steel was clearly revealed. Increased contents of elements such as chrome-nickel and manganese (which acts in a manner analogous to nickel) increase the tendency towards temper-brittleness (the toughness, elongation and reduction in area values are also lowered). Molybdenum is not present in a quantity sufficient to counteract the influence of the other metals in regard to temper-brittleness. Molybdenum exerts a beneficial influence on the steel, since it improves both toughness and tensile strength of the steel. (See Table IV).

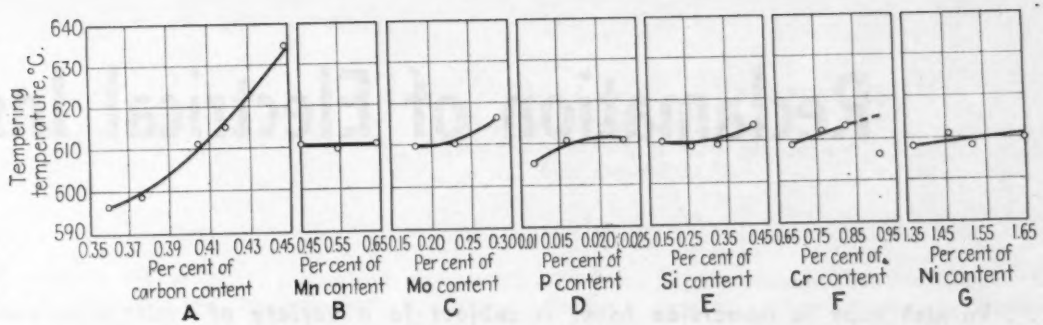
Previously investigated steels were not prone to temper-brittleness and the heat treatment was adjusted so as to avoid the critical range. The toughness of the hardened steel SAE X4340 can be considerably improved

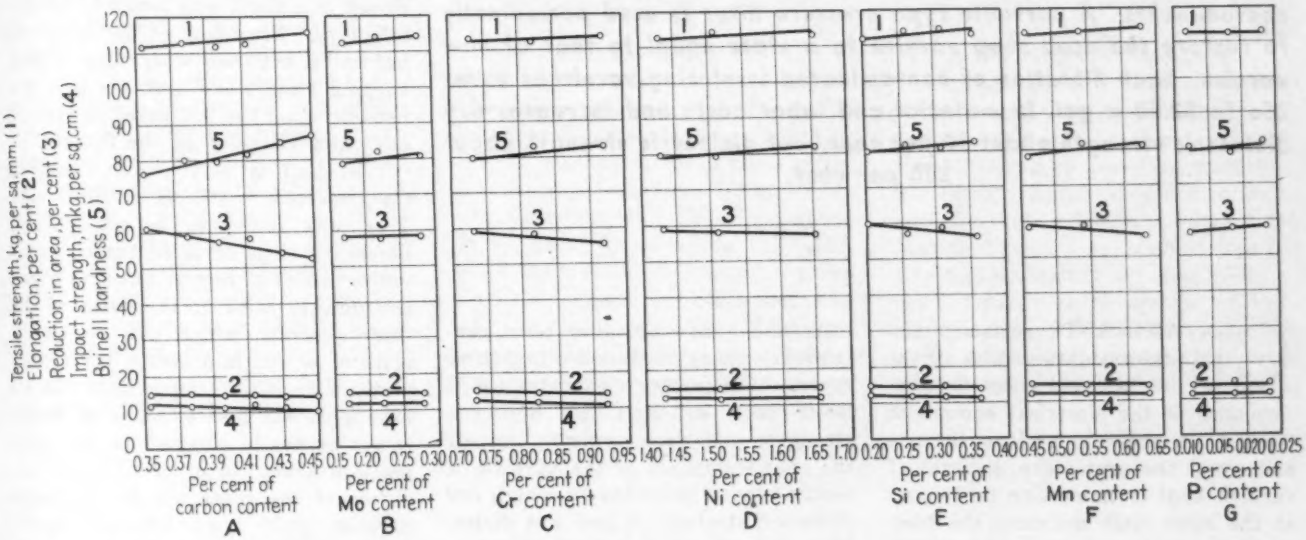
RIGHT

FIG. 1 — Relation of tempering temperature to the chemical composition of the steel.

BELOW

FIG. 2 — Relationship between the mechanical properties and the alloying elements in the steel.





by more rapid cooling after tempering. This steel should be cooled in water or oil after tempering.

(2) The elements P, C, Mo, Si, Cr, Ni influence the temperature stability of the steel in a positive manner in ascending order as shown, but the effect of carbon is approximately 40 times that of nickel, 6 times that of molybdenum and approximately 20 times that of Cr and Si.

(3) In order to find the required mechanical properties, the hardened steel SAE X4340 should be tempered between 570 deg. C. (1058 deg. F.) and 645 deg. C. (1195 deg. F.). The tempering temperature must be calculated on the basis of C, with the necessary adjustments for the other elements, as shown in Fig. 1 and in Table II.

(4) Steel SAE X4340 can be replaced by a steel with little nickel as follows: Ni 0.50 per cent max., Mn 0.70 to 1.10, Cr. 0.75 to 1.05, P 0.040 max., S 0.040 max., and the other elements similar to the steel SAE X4340. The proposed steel is easily produced in the open hearth furnace. The heat treatment must be as follows: Oil hardening from 830 deg. C. (1526 deg. F.) to 900 deg. C. (1652 deg. F.) and tempering for the required mechanical specification with subsequent oil or water quench is absolutely essential.

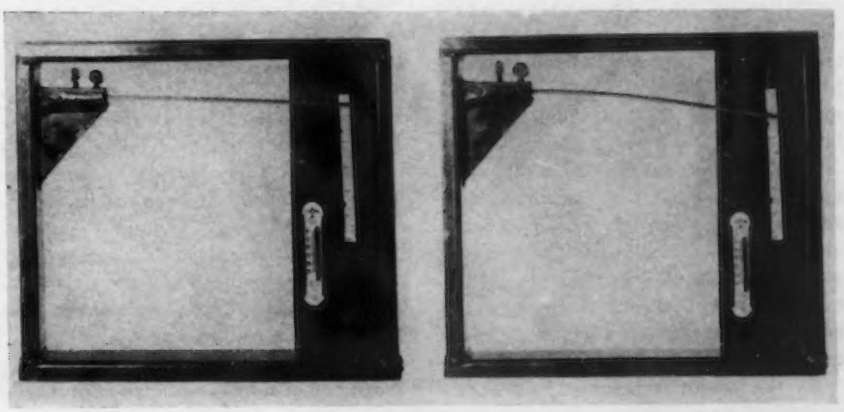
The suggested chemical composition is well balanced and can be produced in practice within close limits.

Jig Compares Stiffness of Steel and Cast Iron

A SIMPLE device for demonstrating the greater stiffness of steel over cast iron has been devised by C. W. Lytton, welding engineer of the Lincoln Electric Co., Cleveland. It consists of a square-shaped jig. welded of channels to form a 15½ by 13½ in. structure.

In demonstrating, two 12 in. bars of ½ x ⅛ in. section are used, one of steel and the other of cast iron. A load of 2½ lb. is applied through a rod attached to a small spring scale, the other end of the rod being attached to the specimen 9¾ in. from the fixed support.

Deflection of the steel rod under this load is 15/32 in., as shown by the rule fastened at the right of the jig. For the cast iron bar the deflection measures 1 5/32 in., thus proving that the steel bar is approximately 2½ times as stiff as cast iron.



Reclamation of Electrical Insulating

. . . Varnish kept in immersion tanks is subject to a variety of contaminants. A portable type pressure filter is used periodically to restore the used shop varnish to a state equal to that of new varnish. Each filtration of contaminated insulating varnishes saves 25c to $2.50 a gal. in material and labor costs and increases dry dielectric strength about 30 per cent, wet dielectric strength about 200 per cent.

o o o

CONTAMINANTS seriously impair the insulation value of the varnish film and lower the performance of the electrical equipment treated. In order to prolong the use and avoid the premature disposal of varnish kept in immersion tanks and at the same time maintain the high insulating values needed, a satisfactory method of cleaning the varnish, without interfering with production, has been developed. Portable pressure filters have proved adequate for this operation. In addition, a system for control and test of these varnishes has been developed which indicates when filtering is needed.

The varnish may be contaminated in three ways. The contaminant may be washed from a piece of apparatus while it is immersed in the varnish tank. For example, when rehabilitated armatures are being processed, some of the dust and dirt accumulated in industrial use is washed into the varnish tanks. This results in the suspension of particles of a particularly troublesome nature in the varnish.

A second means of contamination is through the air. Varnish tanks or varnish treating rooms are located often in the center of manufacturing activities. Carbonaceous dust, metal chips of small diameter, small droplets or paint from nearby spray booths, and other foreign material may enter the varnish when the tank lid is open.

Finally, material foreign to the varnish may be added by mistake. The addition of a varnish whose resin is only slightly soluble in the varnish and its solvent in the tank is an example. Here the foreign resin would be precipitated out, possibly as troublesome colloidal particles.

By the use of wet and dry dielectric tests and heat endurance tests contamination may be classified into three types. Conducting particles may lower both wet and dry dielectric strength, and very probably impair the heat endurance of the varnish. A second type is identified by a high dry dielectric strength, a low wet dielectric strength, and a low heat endurance. Contamination producing varnish gels or precipitated resins might not lower the dielectric strength but might lower the heat endurance or life of the varnish film.

Disruption of the varnish film by particles of foreign matter seriously impairs the properties of the insulation. On electrical equipment there is no need to mention the effect of electrically conducting or ionizing particles on the dielectric breakdown value, particularly when they become imbedded in the insulation. In some cases, although the particles are not conducting, they cut into the insulation during processing, lowering the breakdown level of the material.

Thus, it is important to keep varnish for treating electrical equipment as clean and as free from foreign material as possible. As a base or goal, the electrical properties and mechanical properties should be kept in the same order of magnitude as those of the new varnish.

Careful control of the varnish requires an adequate filtration method. The particle sizes of contaminants range from large pieces of wood to colloidal carbon. Pieces of metal as small as 0.003 in. in diameter have been found. A study of the available methods suggested that the most efficient method of reclamation of the varnish was by pressure filtration.

A portable type pressure filter, consisting of a number of horizontal, circular plates stacked vertically and enclosed in a shell, was found to be satisfactory. Pressures of 15 to 28 lb. per sq. in. are used with rates of flow varying from 1 to 5 gal. per min. depending upon the pressure, amount of cake and viscosity of the filtrate.

Filtration is carried out using a diatomaceous earth as a filter aid. This was found to be particularly necessary since some of the contaminating material filtered out was a gel, and quickly filled up the pores of the filter medium, which can be paper, cloth or screen laid over a perforated plate. The addition of a filter aid allows a porous cake to build up which is not as easily clogged as the filter medium alone. In order to avoid addition of the filter aid to the large varnish tanks, two 100 gal. tanks were set up in which the diatomaceous earth was continuously mixed with the incoming varnish stream. Varnish was pumped from here through the filters and into a clean tank in the system.

In addition, strainers which eliminate particles greater than 20 mils in diameter have been installed in the tank system. The particles which are particularly troublesome are, in general, below 20 mils in diameter.

Varnish in use in repair shops or manufacturing plants obviously cannot be heated because of fire hazard. Heat causes rapid polymerization, with a resulting short tank life. Hence, filtering must be done at room temperatures, usually 20 to 35 deg. C., with consequently higher viscosities. The viscosity will vary with the type of varnish and condition of the varnish in the tank. A rise of temperature in a varnish tank from 25 deg. C. to 35 deg. C. will lower the viscosity approximately 50 per cent; so it is important to filter at 25 deg. C. or higher, if possible. In addition, the portable shop filter may be called upon to handle different types of varnish. When changing from one varnish tank to another, careful cleaning of the filter is required. Where there are 10 to 12 different types of insulating varnishes in use, each filtering operation must be planned and carried out separately.

The efficiency of the filtering treatment is judged by a series of chemical

Varnish . . .

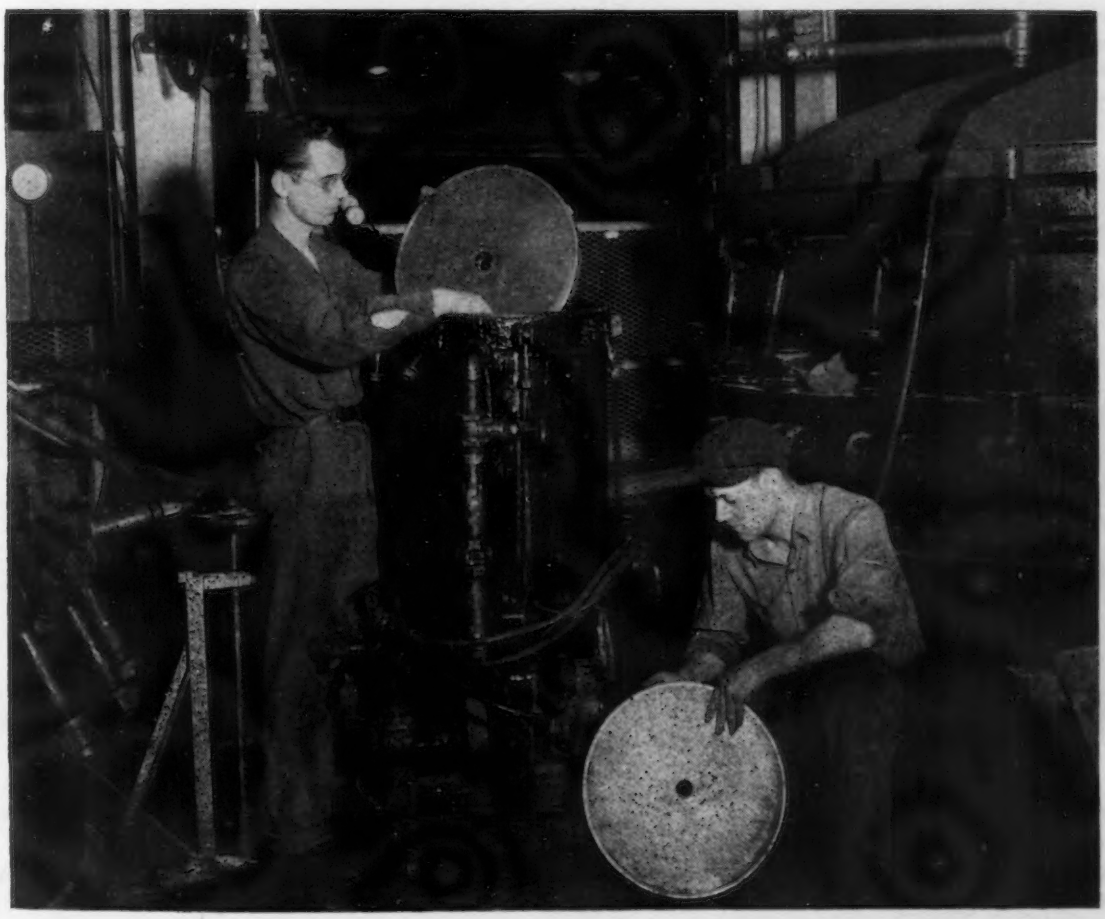
By D. L. GIBSON and C. H. BRAITHWAITE
Insulation Development Engineers
Westinghouse Electric & Manufacturing Co.,
East Pittsburgh, Pa.

and physical tests on samples taken before and after filtration. Viscosity, percentage of solids and specific gravities at 25 deg. C. are checked. Significant results are obtained from dielectric tests and a heat endurance or life determination test made on a varnish film. Heat endurance is determined by depositing varnish films of 0.002 in. thickness on copper strips. These are continuously heated at 150 deg. C. and the time noted to produce failure of the film on bending about a ⅛ in. mandrel. Dielectric tests consist of measuring the dielectric breakdown strength of a 0.002 in. thick varnish film on each side of a 5 mil copper sheet, both as received and after immersion in water for 24 hr.

Improvements in dielectric properties produced by filtering the varnish are remarkable. An average increase in dry dieletric strength in the order of 30 per cent and in the wet dielectric strength in the order of 200 to 250 per cent were found. Heat endurance and the mechanical properties of the varnish improved from 10 to 20 per cent upon filtering. Plastic asphalt type varnish improved in this characteristic over 40 per cent after filtering. An increase in heat endurance indicates that particles of colloidal matter which damage the varnish film have been removed. The improvements cited are examples of varnish in poor enough condition to show the harmful effects of extreme contamination. Varnish tank contents should not be allowed to fall to such a poor level under ordinary conditions.

From compilation and correlation of much data with manufacturing experience, it has been found that frequent filtering of insulating varnishes is necessary during shop use to maintain the high insulating level of the varnish film and to prevent possible mechanical damage of insulation by foreign particles. Filtration of elecrical insulating varnish is a step forward in the conservation of those critical materials used in its manufacture.

SUCCESSFUL filtering of insulating varnish by this Sparkler portable pressure filter depends on the care exercised in cleaning the stainless steel filter plates. The filter has a capacity of 2000 gal. for each run. Pressures of 15 to 28 lb. per sq. in. are used with rates of flow varying from 1 to 5 gal. per min. depending upon the pressure, amount of cake and viscosity of filtrate.

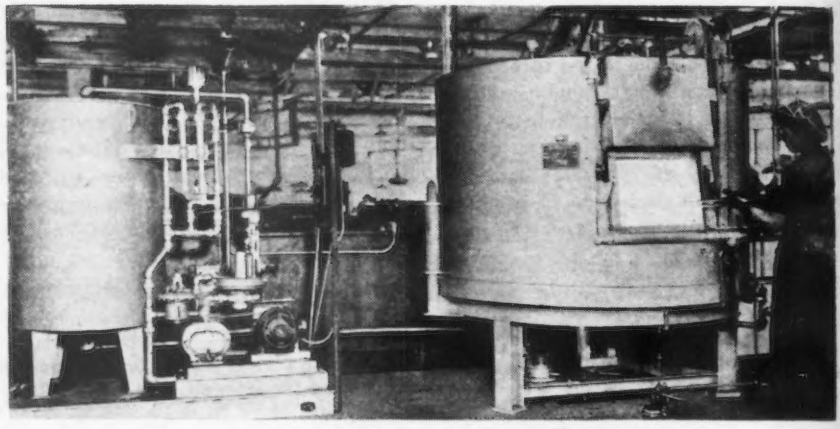


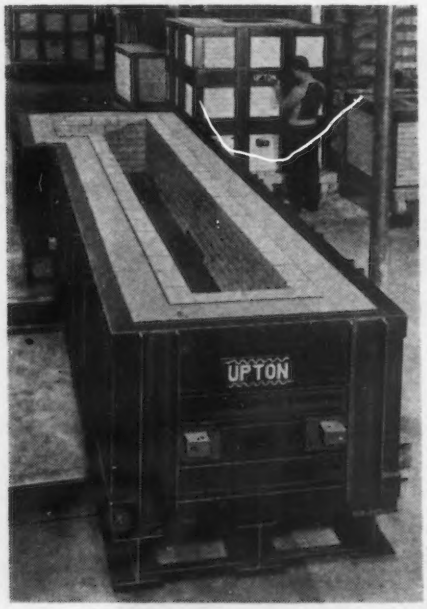
New Equipment . . .

Heat Treating and Process Control

. . . Recent developments in heat treating furnaces, induction heating equipment, process control and analyzing instruments are described in the following pages.

FOR heat treating cartridge cases of exceptionally large size, an electric salt bath furnace having a pot size of 21 ft. x 56 in. and a working depth of 21½ in. has been completed by the *Upton Electric Furnace Div.*, 7450 Mellville Street, Detroit. Uniform heating of the salt is accomplished by a series of sealed electrodes which extend through from the outside of the furnace where connection is made to the transformers. The electrodes are built so that their inside surface is flush with the interior bricking surface of the walls and floor of the pot. No electrodes extend from above the surface of the salt, eliminating the possibility of shorting and burning the work. The molten salt is held at a temperature of approximately 900 deg. F. Three phase current is fed to six transformers and electrodes.



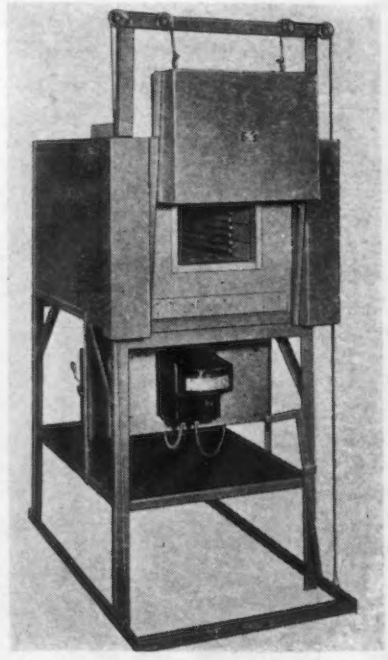


Rotary Hearth Furnace

ROTARY hearth furnaces for hardening parts that require individual handling for fixture quenching and with no scale or decarburization have been developed by *Westinghouse Electric & Mfg. Co.* The furnace hardens up to approximately 300 lb. of work per hr. and one operator can perform the charging, discharging and quenching operations. The hearth rotates automatically. Heating cycles can be varied to suit the size of pieces to be hardened. A time clock rings a bell to notify the operator when work arrives at the door, which is air operated by means of a foot control valve. The furnace shell is made gas tight for using Endogas atmosphere. A high velocity flame curtain prevents air entering the heating chamber when the door is opened.

Heat Treating Furnaces

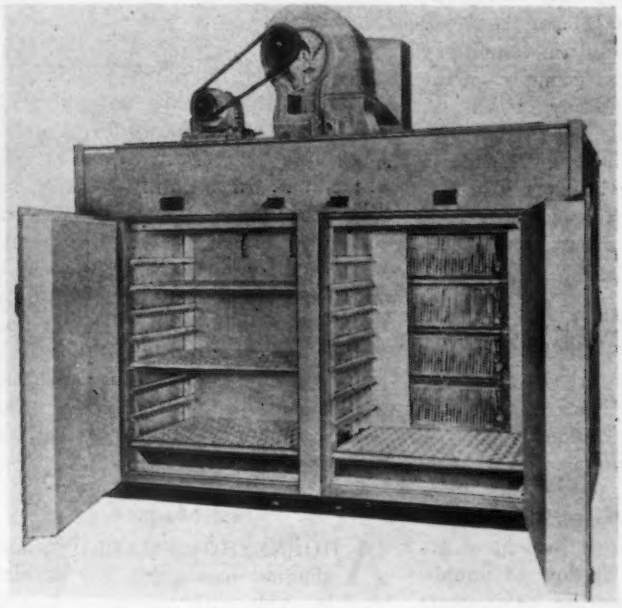
A SERIES of floor model furnaces consisting of five basic designs has been announced by *K. H. Huppert Co.*, 6830 Cottage Grove Avenue, Chicago, 37. The Model 16, illustrated, has work chamber dimensions of 12 in. wide, 8 in. high and 18 in. deep, plus 8 in. throat. The furnace body is constructed of 14 gage steel reinforced on all corners. These furnaces can be operated on 220 volt single or three phase line and in many instances can be supplied for special voltages up to 440 volts, three phase. Heating elements have totally enclosed contacts and connecting wiring is brought through the back of the furnace into a special compartment.



Recirculating Electric Oven

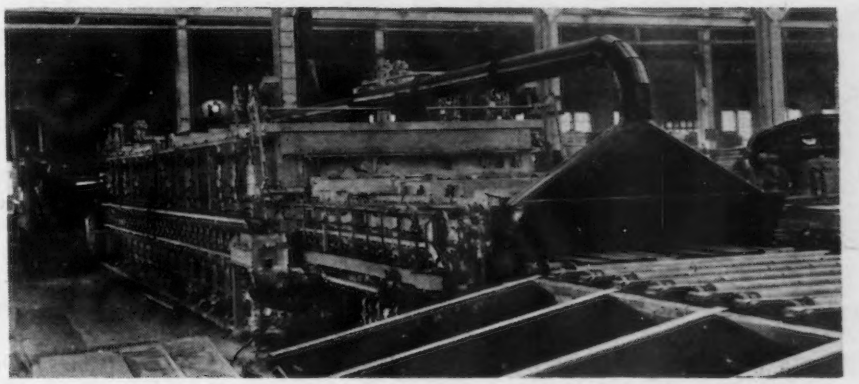
PARTICULARLY desirable for objects which are hollow and open at the top or can be arranged on

trays or suspended from cross bars in such a manner as to permit the heated air to sweep down over the work, a down flow recirculating type electric oven which combines forced convection heating and rapid recirculation has been developed by *Gehnrich Oven Div. of W. S. Rockwell Co.*, 50 Church Street, New York 7. Designed originally to preheat hollow magnesium castings, the oven is also applicable in process drying, finish baking and heat treating operations at any temperature to 1000 deg. F. The oven can be built as a single or multiple compartment unit of any desired size. A motor driven fan mounted at the top of the oven blows the heated air through a distribution duct at the top of the oven interior, with the air moving down through the work, passing through the floor, back through the heater space and up to the fan intake at the rate of 28 or more complete air changes per min. Auxiliary equipment includes temperature control with thermocouples, alarm temperature limit switch, and a switch which interlocks the heat supply and circulation systems.



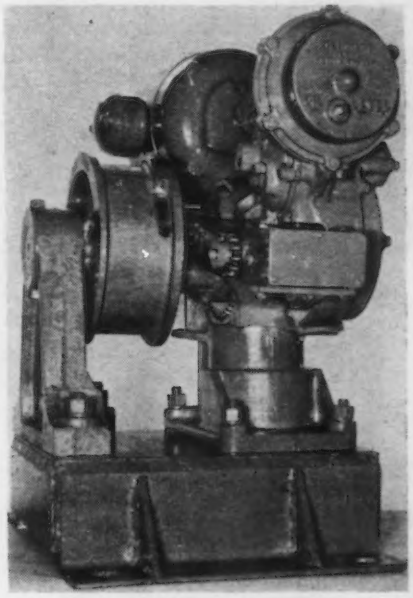
Annealing Furnace

FOR annealing brass slabs at a production of from 10,000 to 15,000 lb. per hr. and for the annealing of copper, brass, cupro-nickel and ferrous tubing and rods, *W. S. Rockwell Co.*, 50 Church Street, New York 7, has developed the Rockwell continuous roller hearth annealing furnace. The work is carried on closely spaced, highly polished rollers extending the entire furnace width and through the furnace walls. A special sealing box around the neck of the roller prevents any air infiltration into or heat leakage out of the furnace. The furnace is heated by burners located on both sides of the furnace above and below the hearth level, utilizing gas premixed with the proper quantity of air. Safeguards are provided to insure thorough purging of the furnace before lighting. Temperature control is automatic. The annealing temperature range of the furnace is from 750 to 1800 deg. F.



Rivet Heating Forge

A PORTABLE, gas-fired rivet heating forge specially suited for getting into confined spaces, has been announced by *James H. Knapp Co.*, 4920 Loma Vista Avenue, Los Angeles 11. The forge operates on compressed air and natural gas and is supplied complete with burner and necessary control valves. It has a heating space 8 in. in diameter by 7 in. deep and an overall weight of 85 lb. The forge can also be furnished for operation on light oils.

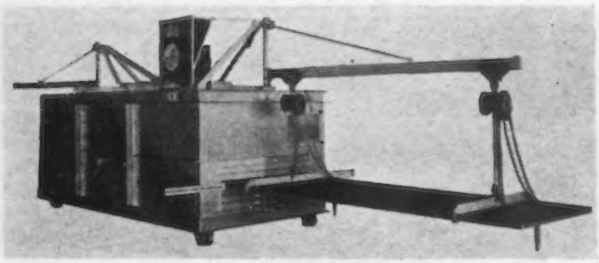


Furnace Door Hoist

DESIGNED for use with either chain or wire rope lifting members, an industrial furnace door hoist for floor mounting, known as the Model RD unit, which operates without counterweights, has been announced by *Fred J. Ryan Co.*, Wyncote, Pa. The hoist equipment is said to combine low horsepower demand with positive control on both braking and limit of operation. The RD unit is adaptable to old or new installations.

Magnesium Preheat Furnace

A TRAY type furnace for preheating magnesium sheets up to 600 deg. prior to press forming, with capacity for seven sheets of magnesium alloy up to 4 ft. wide, 12 ft. long and



¼ in. thick has been announced by *James H. Knapp Co.*, 4920 Loma Vista Avenue, Los Angeles 11. The furnace is electrically heated, and is equipped with three blowers on one shaft. Reduced heat input for the "soaking period" or for low temperature operation is provided by a Leeds & Northrup potentiometer recorder controller. At the furnace ends, jib booms with chain hoists handle the hot tray loads.

Induction Heating Unit

PARTICULARLY adapted to the high speed induction surface hardening of such parts as bearing surfaces, cam faces and gear tooth contours and also to brazing and silver soldering, a 25 kw. Megatherm induction heating unit has been introduced by *Federal Telephone & Radio Corp.*, Newark, N. J. This unit uses frequencies between 2-5 million cycle per sec. The heating fixture is a simple coil of from one to five turns which can be constructed readily from standard copper tubing. The overall efficiency is guaranteed to equal or exceed 50 per cent.

Electronic Relay

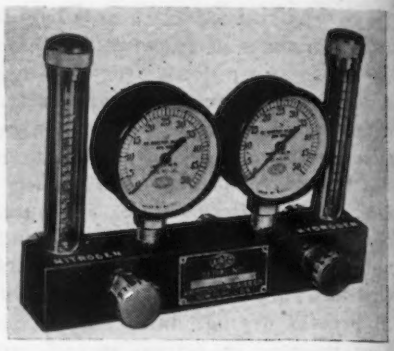
AN electronic relay for amplifying the very limited current transmitted by delicate control contacts or high resistance circuits has been announced by *General Electric Co.* Operated by any material having a resistance of from 0 to 500,000 ohm or greater, the new relay is specially suitable for controlling liquid levels in tanks and boilers, sorting metallic parts by size and as a limit switch requiring extremely light pressure to operate. In operation, the electromagnetic relay in the device is kept energized as long as the controls connected to the input grid circuit of the electronic tube remain open. The instant the contacts close, the relay is de-energized. A built-in time delay feature prevents chattering when the contacts are momentarily closed. A contact arrangement on the electromagnetic relay permits the device to be used to make or break a load circuit when the actuating contacts connected to the input circuit on the electronic relay are closed.

Heat Controllers

ADDITION of three new instruments to its line of industrial controllers and refinements in a fourth, has been announced by *Wheelco Instruments Co.*, Chicago 7. Two of the new instruments, designated Inputrols, are designed to control input of power, heat or flow of liquids or gases to any process equipment. The third, Throttrol, is designed to correct variations in heat requirements of furnaces and process equipment by positioning a valve in the fuel line. The fourth, Rheotrol, a manually operated controller for regulating input to electrically operated furnaces, ovens, heaters, kilns, etc., has been refined and is now offered in a flush-mounted case.

Gas Proportioner

A GAS proportioner, the Airco, designed to produce an accurately proportioned mixture of gases for protective atmospheres at a pressure not in excess of 5 lb. per sq. in. has been announced by *Air Reduction Sales Co.*, 60 East 42nd Street, New York, 16. The proportioner can be furnished with any two of six available flowmeters permitting a wide variation in the proportions of the two gases to be mixed. Flowmeters for hydrogen service cover a range from approximately 2 to 200 cu. ft. per hr.



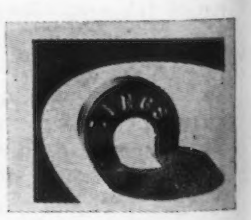
and for nitrogen the range is from approximately 6 to 140 cu. ft. The gases should be supplied through two-stage regulators capable of delivering the required volume at pressures from 10 to 25 lb.

Quench Oil Accelerator

TO raise ordinary quenching oils to the performance levels of fast quenching oils, *Park Chemical Co.*, 614 Boulevard Building, Detroit, has announced Park quench oil accelerator, an all mineral product. By adding this oil in a ratio of one to four to oil already in a system, the viscosity, flash and fire points of the original oil are raised slightly while cooling rates for steel are increased. Deleterious elements in the original quenching oil are diluted without any stratification or settling out.

Test Magnet

A HORSESHOE-SHAPED Alnico magnet measuring 2½ in. high by 3 in. wide with pole bases ¾ x ¾ in., suitable for test work in chemical, physical and mineralogical laboratories as well as in smelting and refining plants, is available through the *Dings Magnetic Separator Co.*, 509 East Smith Street, Milwaukee 7. The unit weighs 14½ oz.



Electronic Controller-Recorder

RELEASE of an electronic circular chart potentiometer controller for manufacture of either war or civilian goods is announced by the *Brown Instrument Co.*, Philadelphia, division of Minneapolis-Honeywell Regulator Co. Each of two models will have several new features, including a control point index which is in red and of the same general shape as the black temperature pointer.

FOR BETTER DODGING

THROUGH WOLF PACKS

Oilgear powers the steering gear mechanism in the world's first Victory ship . . . and subsequent ones. In addition to the greater ship maneuverability and rudder safety, Oilgear provides lower installation cost and simpler installation and immunity of control to pressure in the system.

ARE YOU TRYING TO:

1. Apply large forces through long . . . or short . . . strokes at variable speeds?
2. Obtain automatic work cycles, variable speeds in either direction . . . with or without pre-set time dwell?
3. Apply large forces through continuous or intermittent reciprocating cycles at constant or variable velocities?
4. Obtain extremely accurate control of either position or speed of a reciprocating member?
5. Apply accurately variable pressure either static or in motion?
6. Closely synchronize various motions, operations or functions?
7. Apply light . . . or heavy . . . forces at extremely high velocities through either long or short distances of travel?
8. Obtain continuous automatic reversing drives at constant R. P. M. or over a wide range of speed variation?
9. Obtain accurate remote control of speed and direction of rotation, rates of acceleration and/or deceleration?
10. Obtain constant horsepower output through all or part of a speed range?
11. Obtain automatic torque control?
12. Obtain accurately matched speed of various rotating elements?
13. Obtain constant speed output from a variable speed input?
14. Obtain full pre-set automatic control, elimination of problems of shock, vibration, etc.?

You Need Oilgear!

IN YOUR MACHINES *Oilgear's* MORE ACCURATE CONTROL MAY MEAN FAR BETTER PERFORMANCE

The places where Oilgear Fluid Power can be used to advantage seem endless. Serving as the power link between the man at the wheel and the rudder that steers the ship, Oilgear Fluid Power provides 8 times more accurate rudder control in the new ships . . . far greater ship maneuverability and a rudder safety factor not obtained before. These same Oilgear functions, or any combination of scores of other Oilgear functions, can mean a great deal to the machine you are building or the machine you are using.

With the known wide applicability of Oilgear Fluid Power Systems, their record of success in machines, processes, war equipment, in speeding operations, bettering performance, simplifying design, and accomplishing the "impossible", we believe the soundest step you can take at this time is to learn more about Oilgear. Why don't you write Oilgear engineers *today?* . . . THE OILGEAR COMPANY, 1303 West Bruce Street, Milwaukee 4, Wisconsin.

OILGEAR

Fluid Power

Assembly Line . . . STANLEY H. BRAMS

• WPB discusses plans to stimulate foundry and forge production; cites war costs; finds dealer parts stock short against sales . . . Easier frame of mind is evident on production schedules.

DETROIT—Efforts to speed up production in the foundry and forge shops of the country in line with currently enlarged requirements occupied the attention of a two-day conference of War Production Board officials here last week.

The regional WPB offices appear to be setting themselves up as a sort of clearing house on foundry and forge problems. The offices all have men traveling their territories, paying special attention today to conditions within shops which may impair production in the future as well as at present; and these men have been instructed to send reports back to their home offices immediately on such indications in foundries and forges. One object of the two-day Detroit conference was to discuss ways and means of speeding up these notices of impending or present difficulties, particularly during August, when the need is critical. It is felt that the advent of cold weather and the gradual working of the labor referral systems will bring enough help into the production-short shops later this year.

One session on absenteeism and worker turnover brought out the fact that regional War Labor Boards have been told to put foundry and forge cases on a "rare and unusual basis," automatically setting them up at the top of lists of grievances to be settled. It was strongly urged that every effort be made to reduce turnover, one speaker declaring that the holding of a worker was equal to hiring of three new ones. Safety and health provisions, elimination of fatigue and monotony and other such factors were counted as important in reducing turnover. Some companies, it was related, have turned to the unions for help in this respect, and have made arrangements for shop stewards to go to the homes of employees to interview workers quitting their jobs, attempting to use this personal basis to retain them on the payroll.

Henry Leyda of the War Manpower Commision Bureau of Placement at Washington asserted that the truck production schedule to date is 80,000 units behind, because of foundry and forge production problems. Army needs for trucks abroad are so intense, he asserted, that the Army has shipped 1,000 units from its camps in this country, even though training will suffer as a result.

Other news of interest also came out of WPB last week. A warning that military requirements will continue to rise until the moment Germany cracks was sounded by Carsten Tiedeman, regional director at Detroit.

He estimated that 1944 European operations would require $38,000,000 worth of steel landing mat surfacing, $43,000,000 in rubberized floats and steel pontoons for temporary bridges, $55,000,000 for highway and railway bridge replacements, and $425,000,000 for railroad rolling stock and rails.

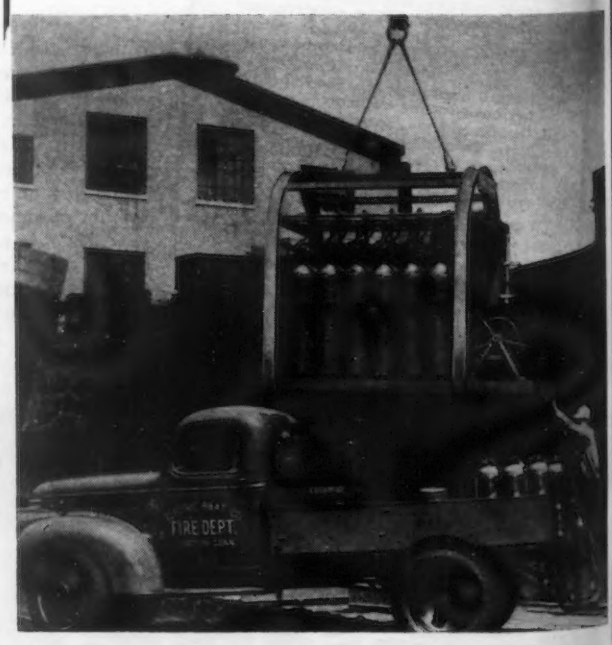
Overall expenditures in 1944 for operational pipe lines for gasoline and oil will total $99,000,000, he said. Expenditures for engineering equipment, such as tractors, cranes, shovels, road graders and scrapers used in landing operations, construction and repair of roads, airfields, ports and docks approximate $20,000,000 a month.

"IN one day's battle with German tanks we have had tanks destroyed that cost $4,000,000," said Tiedeman. "Just to equip an infantry division costs $11,000,000, and each division usually has to be re-equipped after every intensive campaign. An air-borne division costs $7,000,000 to equip for each combat assignment. In seven months of the Italian campaign our armies used 90,000 miles of field wire at $50 per mile. The reconstruction of the port of Naples alone cost $26,000,000, and a like sum is expected in rebuilding Cherbourg."

The WPB automotive branch, headquartered at the Detroit board offices, has just completed a report of a survey designed to show a comparison of replacement parts inventories and labor repair sales.

The upshot of this report, after it

o o o



MOBILE PLATFORM: *U. S. submarines under construction at Electric Boat Co.'s Groton, Conn. yard are safeguarded from fire by* 1200 *lbs. of carbon dioxide fitted onto a mobile platform. Platform may be swung by overhead cranes to various points in the yard.*

o o o

FOR A TICKLISH FINISHING PROBLEM

Call on Kellerflex

1 The slots in this bronze casting are designed to contain blocks of lignum vitae driven in and finished to form an underwater bearing. Obviously the rough slots have to be smoothed down so the wood blocks will seat properly. *But* these slots are inaccessible for ordinary machining methods.

3 From very little up to as much as 3/16" of metal had to be removed in cases where humps existed on the casting. After the Kellerflex did its work, only a small amount of hand scraping was required for leveling up. And time for the job was cut 60%—70%.

Read of this typical case where Pratt & Whitney's Kellerflex flexible shaft equipment "took over" a job that was impossible to do with ordinary machining methods . . . cut operation time by 60%—70% over the hand method!

2 No problem for Kellerflex. With the right-angle hand-piece and the special bur illustrated here, what *could* have been a tedious, difficult job of hand scraping and filing turned out to be simple as A-B-C!

Kellerflex JB-1 with right angle hand piece.

Versatile, dependable, and time-saving, the Pratt & Whitney Kellerflex can take on an infinite number of finishing jobs . . . do them better and do them faster. It is precision-built to the high Pratt & Whitney standards of accuracy—your guarantee of a machine that will stand up and do the job *right*. For full details of various machines and the wide variety of additional equipment and accessories, address our nearest branch office . . . or contact our headquarters. Pratt & Whitney, *Division* Niles-Bement-Pond Company, West Hartford 1, Connecticut. . . . Kellerflex Sales Department.

PRATT & WHITNEY

Division **Niles-Bement-Pond Company**

WEST HARTFORD 1, CONNECTICUT

is digested in Washington, may be more orders for automotive parts manufacturers. This likelihood arises from the fact that auto dealers and repairshops are generally confronted today with shortages of spare parts or extreme difficulties in obtaining them, at the same time that their sales are increasing. Manufacturing is obviously the bottleneck in any such situation, but it may be that WPB will move to alleviate it by the oblique means of enlarging inventory requirements, permitting stocks now ordered held within 60-day levels to be enlarged.

Automotive parts currently most difficult to obtain, the survey showed, are: For engines—bearings, valves and guides, pistons, piston rings, connecting rods, crankshafts, camshafts, cylinder heads, clyinder blocks, fuel pumps, flywheel ring gears, gaskets and waterpump kits. For clutches—plates. For transmissions — gears, shafts and bearings. For steering gears—tie rod ends, drag links, king pins, and spindle bolts. For axles—gears, pinions and bearings. In addition, propeller shafts, universal joints, anti-friction bearings and all gaskets were found in tight supply.

In the face of reducing inventories, a group of eight dealers in one low-priced car group have had dollar volume of labor sales averaging $72,407 a month in 1944, compared with $63,-092 in 1943. The average number of mechanics employed was 10.9 with an average of $664 of labor sales per man, compared with $596 average in 1943, with about the same number of mechanics.

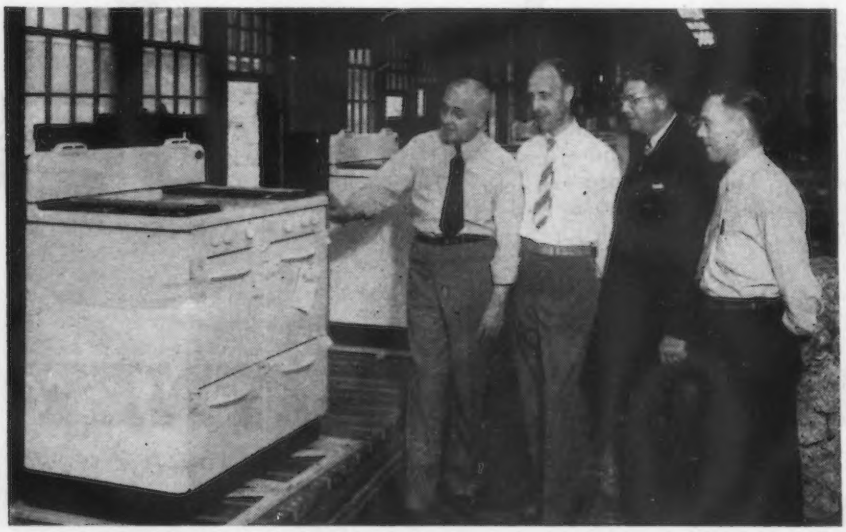
RETURNING to production problems, mention probably should be made of the generallly easier situation which seems to be prevailing on manufacturing schedules in Detroit area. The tenseness and worry over meeting projected rates appear to be gradually evaporating.

By and large, schedules seem to have pretty well stabilized, and there have been enough cancellations developing to match increases in orders. In the leveling out of schedules, work has become more systematized, resulting in some improvement in efficiency. This has made possible a gradual diminution from the employment peaks of last winter and spring. Layoffs in numbers of plants have not been uncommon, and the Detroit Board of Commerce payroll index which stood at 177.9 in the middle of last November, its all-time peak, and at 176.6 at the end of April, has now reduced to 174.3 at most recent tabulation. Average hours of work and pay have continued steady during that period.

Tool and die shops, which have been on a plane of negligibly declining activity from their heavy loads at the first of the year, are so continuing. Some reports are that many shops declined at somewhat accelerated rate during July. Skilled men are becoming more available, these reports state.

Simultaneously, the trend of events is mirrored in the reports of buying trends by the Purchasing Agents Assn. of Detroit. At last reports 6 per cent of all buying by members was on a hand-to-mouth basis, the largest total in this range, beyond sporadic changes, since early 1942. All through this year, with one month's exception, buying within a two-month range has accounted for more than 40 per cent of the total, a state of affairs not previously equaled since early 1940. The purchasing agents are obviously battening down their hatches against the great flood of cancellations anticipated on the end of the European war. One well-posted observer on the buying side said that he believed there is a concerted effort in many of the largest buying units in Detroit's industry to reduce inventories to a 45-day level. Although 60-day supplies are permissible, companies holding notably below that level are said to be doing so to avoid any possibility of argument with the government over leftovers when the cancellations come.

OH, HAPPY DAY!: *James Mitchell, (left) president of the Grand Home Appliance Co., pats approvingly the first new 40 in. Grand gas range to come off the assembly line in Cleveland. Looking on are other Grand executives.*



First Supplement to SWPA Regulation Released

Washington

• • • **The first supplement** to Regulation 1 of the SWPA was released by W. L. Clayton, administrator last week. The supplement extends the general effectiveness of the original regulation and designates the disposal agencies for real estate not previously assigned. As it stood originally, the regulation, while applicable by its terms to all Federal agencies that own or control property, was made effective only to surplus property owned by the Army, Navy and Maritime Commission. As amended, the regulation now covers surplus war property of all Government agencies, with the exception of TVA and the foreign establishments of the State Department.

One of the most important amendments to Reg. 1 is the assignment of all surplus real property of the Army, Navy, Maritime Commission or RFC or one of its subsidiaries, to RFC for disposal. Regulation 1 originally assigned only industrial real property to this agency. Except for specialized types of real property, such as housing and maritime property, surplus real property of all other agencies is assigned to FWA and will be disposed of through the Public Buildings Administration.

How Good Is Your Score On These Questions?

Test your knowledge of tool steel selection and heat treating

The questions listed below come up frequently in every tool room. The right answer makes possible longer tool life, fewer shut downs for re-grinding and greater safety in hardening. The wrong answer costs money through short tool life, production shut downs and greater tool costs.

See if you can select the right answers. Pick the correct one (A, B or C) and check your answers against the list printed in the box at the bottom of the page.

1 —**You should use a *tough-timbre* water-hardening high carbon tool steel**

- ☐ A—For dies with intricate shapes and thin sections
- ☐ B—For a wider margin of safety in hardening
- ☐ C—For tools that require red-hard properties

2 —**When straight carbon tool steel is not tough enough for a job requiring maximum hardness**

- ☐ A—You draw it below C-60/61 Rockwell
- ☐ B—You go to a high speed steel
- ☐ C—You use a .50% carbon silicon-molybdenum water-hardening steel (Carpenter Solar)

3 —**The most useful characteristic of an oil-hardening tool steel is**

- ☐ A—It hardens with a hard case and a tough core
- ☐ B—Safety in hardening and freedom from size change
- ☐ C—Furnace atmosphere does not affect surface hardness

4 —**To increase the toughness of high speed cutting tools**

- ☐ A—Draw at 900°F. for 8 hours
- ☐ B—Quenching in oil instead of cooling in air
- ☐ C—Draw at 1050°/1100° F. for two hours

5 —**The ability to produce a fine grained case and tough core over a wide range of hardening temperatures is an indication of**

- ☐ A—The analysis of the steel
- ☐ B—A low drawing temperature
- ☐ C—Tough-timbre quality tool steel

6 —**Hot acid disc inspected tool steel is insurance against**

- ☐ A—Freedom from decarburization in heat treatment
- ☐ B—Minimum of internal defects
- ☐ C—Excessive size change in hardening

7 —**In order to get maximum wear resistance in a water-hardening tool steel you use**

- ☐ A—A high carbon-tungsten steel (Carpenter K-W)
- ☐ B—You heat treat from a lower hardening temperature
- ☐ C—You quench with fresh water

8 —**To help prevent cracking or splitting of hot forging tools**

- ☐ A—Use a lower forging temperature
- ☐ B—Water cool the dies during operation
- ☐ C—Always preheat tools before putting in service

Did you score 100%? Getting the right answers to your tool steel problems is considerably easier when you use the Carpenter Matched Set Method. In addition to simplifying the selection of the right steel for any type of tool—complete and detailed heat treating instructions are supplied by Carpenter to assure best results. Full information to answer these and other tool steel questions is given in the Carpenter Matched Tool Steel Manual. (Free to tool steel users in the U. S. A.) A request on your company letterhead stating position or title will start your copy on its way.

CORRECT ANSWERS	
1.	B
2.	C
3.	B
4.	A
5.	C
6.	B
7.	A
8.	C

Carpenter MATCHED TOOL STEELS

The Carpenter Steel Co., 121 W. Bern St., Reading, Pa.

Washington . . . .

L. W. MOFFETT

• Events indicate that industry will be under government control for a long time, despite WPB denials . . . Nelson may regain authority if Jimmy Byrnes resigns.

WASHINGTON — Despite all WPB protestations to the contrary, industry will be under the wing of government regulations for a long time—even after the war in Europe ends, if WPB gets its way.

The best proof of WPB intentions is its actions on reconversion. Under orders scheduled to be issued, manufacturers wishing to produce additional civilian goods have to get WPB permission to use manpower, materials and plant capacity for non-military purposes, despite the fact that 30 per cent of war production will be cut out upon the fall of Germany under the latest plans.

The reason no more protest has been raised over this assumption of authority, which WPB lawyers doubt that the agency has, is that the issue has been obscured by Army and Navy opposition to even the most limited resumption of civilian production.

Certainly no one will argue that any production should be permitted to interfere with war and other essential civilian production as long as America is fighting two wars. Some one has to say what production will interfere while fighting Germany and Japan and WPB might as well be the agency. But Congress has not said so or prescribed standards to be followed in permitting industry to readjust to peace needs.

But to say that every manufacturer must get WPB permission to use his own plant and materials until both wars are over is unquestionably reposing a great deal of authority in government bureaucracy, even though it be decentralized bureaucracy. Some manufacturers never were in war production because WPB orders closed them down and they did not reconvert. Many are in loose labor areas now and some have pre-war stocks of materials and work in process.

No matter how well-intentioned WPB is, this course is going to bring charges of favoritism, bungling and unnecessary restraints upon industry. WPB is presuming to say what things should be manufacured first. It has issued a list assigning relative urgency of manufacture to hundreds of items purchased by consumers. What guarantee does industry or the public have that this list is truly representative of need?

Has Congress agreed to it? Has it been ratified by industry groups? When the release of aluminum for civilian manufacture was announced WPB spokesmen said that pots and pans would be produced before cocktail shakers. Why? There is probably enough excess aluminum to make both and it is expected there will be manpower enough to make both if not a great deal of unemployment.

Pots and pans are likely more useful than cocktail shakers, although there are some who would disagree with this assumption. Can it be said that a pot or a pan is more essential than a cocktail shaker to a man who doesn't need a pot, but who does want to buy a cocktail shaker?

The war has numbed normal reaction to such an extent that bureaucratic control seems to be the usual, reasonable and expected. While two wars are in progress, there is excuse for some control of easing production essentials. After Germany falls, there is none.

WPB is planning to issue production quotas, after Germany surrenders. Production quotas are supposed to be needed, because to do otherwise would result in "unbalanced" civilian production. When has production ever been balanced, and of what concern is it to the government to insure preservation of war competitive status precisely as in war?

Complete control over material distribution is going to be asserted for the reason that military needs must be met and no steel consumer is to be permitted to bid material away from the "essential" civilian producer.

Military needs can be met through issuance of allotments and metal pro-

ROYAL PROTECTION: *Marines crouch behind King Kong, a Marine tank, as a shield for their advance towards the Nips on Saipan. The last man in the group uses a walkie-talkie to keep his command post informed as to the progress of the troops.*

SIMPLE OVERHEAD HANDLING SYSTEM

SAVES $150 in FOUR MONTHS!

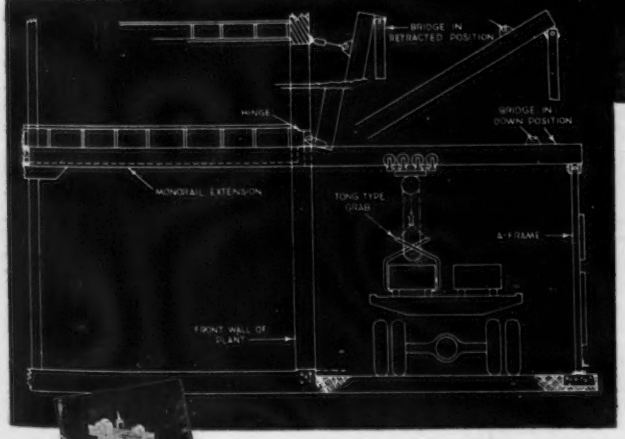


Diagram shows simple system for unloading steel. Crane is retracted against building over door when not in use.

● Steel, formerly unloaded sheet by sheet, is now transferred from trucks to storage in 3-ton bundles. Handling labor was greatly reduced and damage to metal entirely eliminated.

Simple systems like this, worked out by American MonoRail engineers to meet hundreds of operations, speed up production — lower costs — reduce accidents — release skilled hands for more profitable use. Let an American MonoRail engineer show how you can save time and money. Write today!

THE AMERICAN MONORAIL CO.

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ducers can sell the rest of their output to anyone who wants to buy without imperiling transportation or utilities. It should not be forgotten that with the end of the war with Germany, there will be surpluses of all kinds, including materials and components, enough in all likelihood to take care of "essential" civilian production. There will even be a surplus of weapons and shipping.

* * *

THE steel industry, bets are, never thought a dozen years ago that it would become the cradle of a socialistic labor party, as CIO unquestionably is.

There is an odd coincidence that the WLB insistence on the check-off enables CIO to contribute several million dollars to a political campaign. But it is not so odd that union leaders should be willing to invest $3,000,000 with the prospect of gaining a good rake-off through WLB awarding $100,000,000 or so out of its demands now before the board.

The Administration has paid off before, but it was never in such a good position as now to make the payment from public funds, nor has it ever been in greater need of organized labor's fealty. For without a doubt, any wage award by WLB, direct or indirect will reduce steel company revenue to the government and consequently such an award will be made at public expense.

A recent CIO political pronouncement makes this situation very clear, it states: "As you vote, so shall you live." The statement continues to point out that by voting a man can insure or better his standard of living. Since CIO's political complexion is well known, how could the bald admission of the reason for its political allegiance be clearer or more bold?

* * *

IF War Mobilizer James F. Byrnes resigns to return to the private practice of law, as it is rumored he will because he did not get the vice-presidential nomination, WPB Chairman Donald M. Nelson may recapture authority he lost when Mr. Byrnes was appointed "assistant president." There is speculation that Mr. Nelson will be asked to fill Mr. Byrnes' shoes.

It is well-known that major WPB policies are formed by Mr. Byrnes and that his job as referee between the war agencies was supposed to be included in the original grant of authority to Mr. Nelson when WPB was set up.

On the other hand, there are indications that WPB Executive Vice-Chairman Charles E. Wilson may be offered the job. Mr. Wilson's supporters say that the President would not appoint Mr. Nelson because the fact that he could not get along with the Army and Navy was partly responsible for the creation of the Office of War Mobilization. They point out that Mr. Wilson has always gotten along well with the Army and Navy.

See Weaknesses on Union Front

Pittsburgh

• • • **Some events unique** in CIO history have occurrred during the past few weeks, and, coupled with previous events such as the union's wholehearted backing of Henry A. Wallace for Vice-President, may point to some weaknesses showing through the union's front. First was the open declaration of power politics in Pennsylvania that came with the Pennsylvania Political Action Committee's action on July 29 at Harrisburg. The committee set out to raise at least $1 from each Pennsylvania CIO member as part of the national CIO $5,000,000 campaign fund. The 300 delegates from CIO local unions were each armed with receipt books and told to "go out and get the dough if you want political action to succeed."

David J. Macdonald, secretary-treasurer of the USWA-CIO and financial chairman of the National Citizens Political Action Committee, explained that half of the national campaign chest would go to the national committee and the other half to county, state, and regional committees.

He said, "I hope we get $25,000,000. We want all we can get. The more we get, the more we spend. The more we spend, the better Congress we will have. The more we spend in Pennsylvania, the better state legislature we will have.

The committee formed at the meeting of CIO delegates is a campaign committee and funds will be spent in support of CIO endorsed candidates, who now include the national and state Democratic tickets. It was explained that the CIO-PAC which raised $700,000 in union funds, is not permitted to spend that money in campaigning because the law states that it was contributed by unions.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

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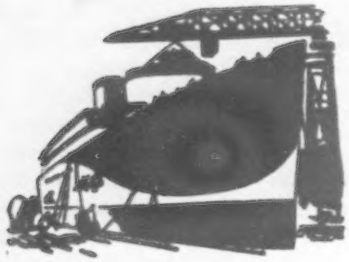
WEST COAST . . . OSGOOD MURDOCK

• Out of 1,400,000 present jobs in manufacturing industry west of the Rockies, a minimum loss of 500,000 seems now assured . . . Labor leadership shows additional evidence of shrewd understanding and practical politics.



SAN FRANCISCO — Out of approximately 1,400,000 jobs and employees in manufacturing industry in the states west of the Rocky Mountains at present, there seems no intellectually honest hope for over 1,000,000 jobs after conversion and for permanent peacetime operation. A loss of 500,000 jobs in this area seems a conservative estimate.

Such was the statement and testimony of research and statistical representatives of the sound, conservative and objective Federal Reserve Bank before the Senate's special committee to study problems of American small business in session here this week under the leadership of Senator James E. Murray of Montana with Senator Tom Stewart of Tennessee and Senator Kenneth S. Wherry of Nebraska also present.

With reasonable allowances for resumption of civilian production and granting increased industrialization and an enlarged West Coast market, the reduction and liquidation of shipbuilding and aircraft activity must be accepted to approximately this extent, say the bank's economists.

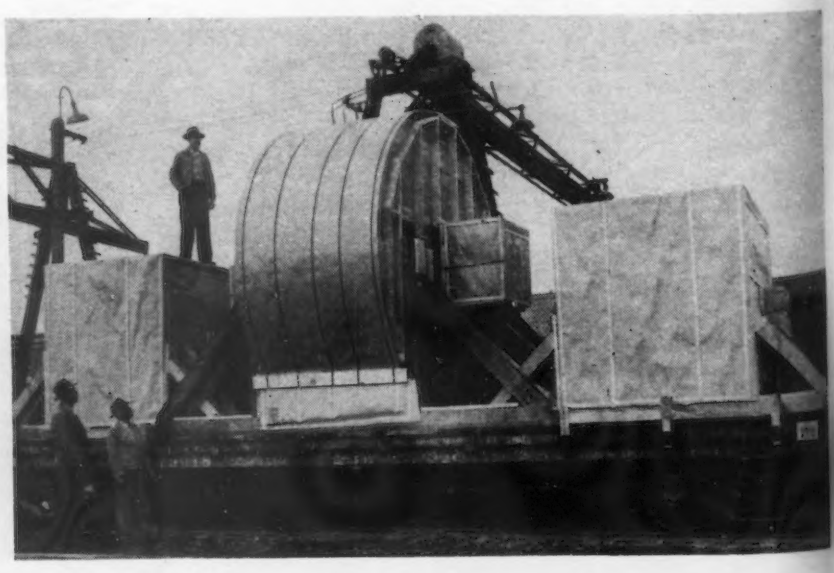
Some postwar planners in this region have suggested that since approximately 25 per cent of all manufacturing workers are now women, their retirement from the field will help to balance the employment account. Miss Elizabeth Hawes, known for her "Wenches with Wrenches," thinks otherwise. Now a full time unionist as member of the United Auto Workers International Education Department, she told delegates to a Los Angeles CIO council last week that some 85 per cent of women now in industry will want their jobs after the war. It is her claim that out of 17 million women now in American industry, only three million are in excess of what there would normally be by now. Even without a war program there were 12 million women working in 1940.

Far western business firms and civic and political subdivisions continue to analyze, speculate and plan in general. Last week General Electric Co. purchased a 57 acre tract of land at San Jose, 50 miles south of San Francisco, for postwar industrial development and operation. Insatiable and effervescent Henry J. Kaiser announced in an offhand and jocular vein that he had agreed to lease, develop and extend the $20,000,000 operation of the Standard Gypsum Co. with its $50,000,000 worth of raw materials and operations along the West Coast from Alaska to Lower California, over the Mexican border. This is sort of a 50-50 partnership deal with Samuel A. Perkins, the 80-year old president of Standard Gypsum, and the Kaiser management suggests that the new component goes logically with cement, steel, gravel aggregates, magnesium and general postwar plans for building material and prefabricated construction.

LABOR is similarly concerned about postwar prospects, but the general attitude of impatient, impetuous, young CIO visionaries is that jobs must be provided, war standards must be maintained, "the show must go on." Liberal organized labor is attempting to strengthen contacts with civil officials and with the Democratic Party apparatus through the Political Action Committee. Support is beseeched for the pending Kilgore Bill. Urgent and eloquent support through the printed word and in public statement is placed behind such semi-political and paternal activities as Smaller War Plants Corp., Farm Security Administration, public Power Authorities, public housing activities and cooperative movements to take over war plants or industrial activities. How far down the ranks such lip service penetrates remains to be seen when the going gets a bit tougher.

Evidence of growing conservatism and more stable leadership was last week apparent in the Machinists

TUNNEL DODGER: *This huge, 47,000 lb., gear case, which stands on a siding near the Joshua Hendy Iron Works in Sunnyvale, Cal., must be routed over a way that is clear of tunnels, narrow cuts and low underpasses when it is shipped. The gear case stands* 17 *ft.* 4½ *in. above the rail and three ft. off the centerline of the car.*



HE READS THE *Unwritten Language*

Lost hunters, treasure seekers, fleeing criminals—all know this man. Where others starve and lose themselves, the woodsman reads the unwritten language of the wilds and survives. In the light of his long experience, even seemingly meaningless little things reveal their story.

Industry too has its unwritten language. For example, in clutches for equipment you build or buy, little details of design and manufacture become important factors in your machine's operation. The Twin Disc Clutch Company has learned about these important little things by building power links for most industrial applications for over 26 years.

It's worth money to let this knowledge be your guide to power transmission and control. Your Twin Disc-equipped machines become better buys because, (a) unexcelled application experience fits power links to jobs perfectly; (b) intimate knowledge of materials and methods makes every detail of clutch design *and* construction right; (c) strategically located factory branches and service stations keep parts and repair service within quick, easy reach always.

You'll find it good business to get all the facts about Twin Disc Clutches and Hydraulic Drives now, while planning for the future. Write for complete details today. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

council of the State of Washington, representing 80,000 workers, resolution denouncing the action of uncertain loud unionists who heckled and broke up a recent Seattle meeting of the Institute of International Relations in session at Plymouth Congregational Church. Local 104 of the Boilermakers Union went so far as publicly by resolution to "deplore the nauseating and reactionary manner in which the Communists utilized in this attack on liberalism a misguided wounded war veteran . . . typical of the line of attack against labor by all ultra-reactionary elements in this country at the present time." Mr. Dave Beck, AFL teamster, sits tight on the lid in the Puget Sound labor satrapy, and the incident in question is undoubtedly being rubbed into the record of CIO, less potent and less responsible in this area. Around San Francisco Bay the once wild-eyed Harry Bridges last week pledged mutual harmony with Adrian J. Falk, president of the local Chamber of Commerce before an audience at the California Labor School, openly sponsored by the Communist Party. Business and profits were espoused by Bridges and labor's gains were lauded and defended by Falk.

•

THERE may be 500,000 too few jobs after the war but there are still 50,000 too few workers now, say Manpower and employment officials. An urgent need for 1100 common laborers in steel mills and 23 foundries and forge shops in southern California is proclaimed by T. C. Campbell, area director for the War Manpower Commission. Several foundries and one mill may be forced to discontinue a shift through lack of labor. High school boys are taking summer jobs in steel plants and foundries, and production of vitally important castings and forgings is being held up. Overall employment in manufacturing establishments in California last month was slightly over 1,000,000 persons, according to the State Department of Industrial Relations, a decrease of 75,000 compared with the same month a year ago. In aircraft plants employment is 23 per cent below last year and in shipyards 15 below, but electrical machinery and equipment is 22½ per cent above and petroleum refineries 26 per cent above a year ago.

Always surprising to laymen is the wage differential in industry between the San Francisco and Los Angeles area, only 400 miles apart and in the same state. Tabulated state labor statistics show that for all durable goods (including aircraft and shipbuilding) average weekly earnings per worker in the San Francisco Bay Industrial area last month were $64.13 compared with $56.38 in the Los Angeles industrial area. Average hourly earnings were $1.394 in the San Francisco plants and $1.23 in the Los Angeles plants. Average hours per week were approximately 46 in both areas.

•

• Of 104,680 total war housing units assigned to the San Francisco Bay area, as of May 1, only 79,844 were completed and 24,536 were yet to be completed. Publicly financed were 74,418 units and privately financed were 29,962 units. The privately financed units were 99 per cent occupied and the publicly financed between 76 and 87 per cent occupied.

•

• To supply the 12,000 welders now employed in the three Kaiser shipyards in the vicinity of Portland, over 33,000 men and women have been trained by the management.

•

• A sweepstakes competition is in progress between four Maritime shipyards on the Pacific Coast, each engaged in the construction of AP-5 attack transports. On the first 12 vessels simultaneously under construction in each of the four plants the following progress was reported last week:

Oregon Shipbuilding Corp. had placed 44,823 tons of hull steel; Vancouver, 35,995; Cal-Ship, 33,357; Richmond No. 2, 29,350. The first AP-5 should be delivered from Oregon Ship sometime in mid-August.

• Ten-hour shifts are being worked by 2000 men and women in the assembly department at Vancouver yard in an emergency spurt to balance production. The 60-hr. week for all employees was announced for two or three weeks. Hours were as follows:

Day shift, 6 a.m. to 4.30 p.m.

Swing shift, 4.30 p.m. to 2.30 a.m.

Graveyard shift, 10.30 p.m. to 8 a.m.

Overlap was principally between the swing and graveyard shifts, designed to prevent overcrowding the bays. Graveyard employees were paid the 15 per cent shift premium for their entire 10 hours and the swing shift 10 per cent for their 10 hours. All employees were paid for 70 hours and worked 60.

Jessop Now Furnishing Fabricators With Steel Sheets

Washington, Pa.

• • • **Jessop Steel Co.**, Washington, Pa., through the addition of new production equipment, is now able to furnish fabricators with light gage stainless-clad steel sheets. Thicknesses from 16 gage to 12 gage can now be produced in widths from 24 in. to 50 in. and in lengths up to 120 in. The 18 gage can be furnished in all the above widths and up to 96 in. in length. Polished sheets are available in all sizes up to 48 in. wide.

Twenty per cent of the total thickness of these clad sheets is Jessop Stainless Steel. They are recommended for such applications as steel jacketed kettles, cold storage room linings, table tops where corrosion resistance is a prime requisite, various cooking utensils, numerous items of hospital equipment and storage vessels.

Net Income Announced

Wheeling W. Va.

• • • **Wheeling Steel Corp.** announced a consolidated net income for the quarter ending June 30, 1944, of $1,068,671 after provision for federal income and excess profits taxes. This compares with $1,329,010 earned during the same period of 1943.

For the first half of this year, earnings totaled $2,061,616, as against $2,290,401 earned during the six months ending June 30, 1943.

. . . Cited for Awards . . .

• • • **The following companies** have been awarded the Army-Navy E for excellence in war production:

Goodyear Decatur Mills, Goodyear Tire & Rubber Co., Decatur, Ala.

Foxboro Co., Foxboro, Mass. (second star)

Package Machinery Co., Springfield, Mass. (star)

Illinois Gear & Machine Co., Chicago. (second star)

Haines Gauge Co., Philadelphia. (second star)

General Engineering Works, Chicago.

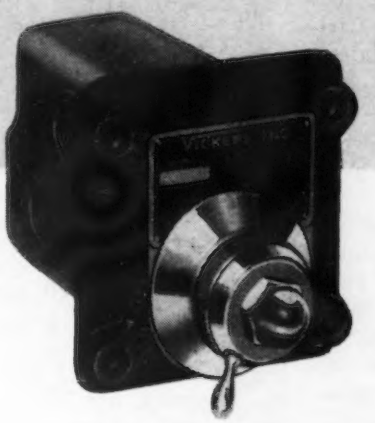
Vandercook & Sons, Chicago.

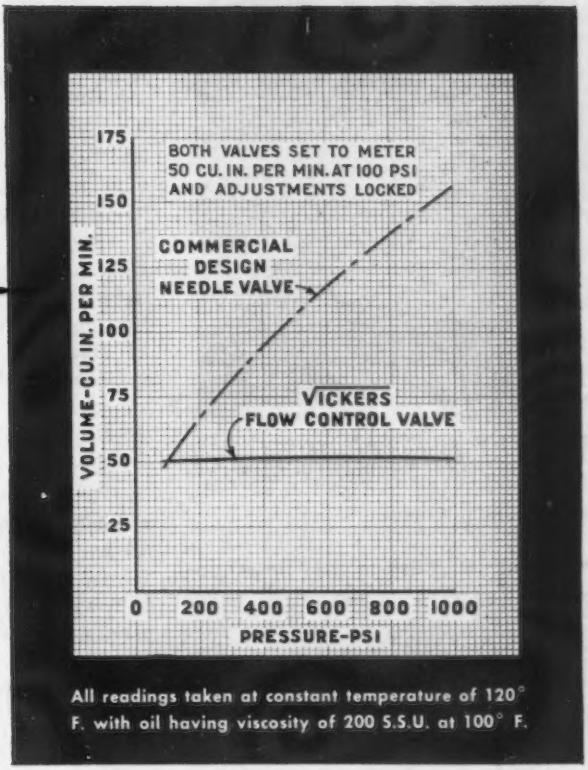
Jones & Laughlin Steel Corp., Otis Works, Cleveland.

CONSTANT FLOW RATE

Regardless of

VARIATIONS IN FLUID PRESSURE





All readings taken at constant temperature of 120° F. with oil having viscosity of 200 S.S.U. at 100° F.

As shown by test chart at right, the Vickers Flow Control Valve maintains a practically constant metering rate (for a given setting of the control adjustment) regardless of variation in fluid pressure. This ability to accurately control the rate of travel of tool head or slide . . . or the rpm of a hydraulically driven work spindle . . . at all times regardless of the resistance encountered is a fundamental requirement of many types of machine tools and special machinery. The absence of a hesitation, jump or a speed variation with a load change is important because these nearly always are detrimental to tool life, work finish or proper operation. Tool damage when "breaking through" work is eliminated and variations in cut or operating pressure have no appreciable effect upon feed rate. See Bulletin 40-15 for complete information.

Vickers Application Engineers will gladly discuss with you how "hydraulics" can be used to your advantage.

VICKERS

Adjustable FLOW CONTROL VALVES

VICKERS *Incorporated*

OAKMAN BLVD. • DETROIT 32, MICHIGAN

Application Engineering Offices: CHICAGO • CLEVELAND • DETROIT • LOS ANGELES
NEWARK • PHILADELPHIA • ROCHESTER • ROCKFORD • TULSA • WORCESTER

Representative of More than 5,000 Standardized Vickers Units for Every Hydraulic Power and Control Function

CONSTANT DELIVERY PUMPS | FLUID MOTORS | DIRECTIONAL CONTROLS | VOLUME CONTROLS | PRESSURE CONTROLS | CONTROL ASSEMBLIES | VARIABLE DELIVERY PUMPS

PERSONALS

ROBERT S. CLINGAN, general manager of sales, Copperweld Steel Co.

• **Robert S. Clingan** has been appointed general manager of sales, Copperweld Steel Co., Warren, Ohio. Mr. Clingan had been the Chicago district manager. Prior to joining the Copperweld Steel Co., he was associated with Republic Steel Corp.

• **B. J. Trautman** has been appointed manager of works of the Hammond, Ind., plant of Pullman-Standard Car Mfg. Co. Mr. Trautman has been at Hammond since 1940 as chief engineer in charge of military equipment and as assistant manager of works.

• **A. R. Toepfer,** has joined the Chicago-Latrobe Twist Drill Works as district representative for the Wisconsin and Minnesota territory.

• **Dr. L. W. Eastwood,** formerly vice-president of the Maryland Sanitary Mfg. Co., has been named to the staff of Battelle Memorial Institute, where he is engaged in metallurgical research.

• **Donald W. McGill** has been appointed manager of the machinery electrification section of the Industrial Department, Westinghouse Electric & Mfg. Co. He succeeds **L. F. A. Mitchell,** who has returned to the Canadian Westinghouse Co. as assistant to the vice-president. **R. T. Muench,** manager of the Detroit X-ray office of Westinghouse, has been made manager of the X-ray Products Department at Pittsburgh.

• **R. E. Henderson** has been made eastern sales representative for the Wickman Corp., Detroit.

• **Harold L. Wilson,** a member of the personnel staff of Lukens Steel Co., By-Products Steel Corp. and Lukenweld, Inc., Coatesville, Pa., has been appointed assistant to the general superintendent in charge of personnel relations for Lukens.

• **C. R. Welles,** manager of Hanna Furnace Corp.'s New York office for 12 years, has been appointed eastern district manager of sales for the Hanna Co., the merchant pig iron division of National Steel Corp. **Carl A. Harmon,** formerly metallurgical engineer for Republic Steel Corp., has joined Hanna Furnace Corp. as chief metallurgist, with headquarters at Buffalo.

• **Edwin L. Bertram** has resumed his prewar position with the Automatic Transportation Co., Division of Yale & Towne Mfg. Co., Chicago, as sales promotion and advertising manager. He will direct the company's program on electric propelled industrial trucks.

• **L. T. Willison** has been appointed manager of cold finished sales in addition to his duties as manager of ordnance sales of Jones & Laughlin Steel Corp., Pittsburgh. Mr. Willison has been with Jones & Laughlin since 1937 serving in various metallurgical and sales capacities. **C. F. Goldcamp,** who has been manager of cold finished sales for the company, has resigned.

L. T. WILLISON, manager of cold finished sales, Jones & Laughlin Steel Corp.

JAMES R. LONGWELL, director of engineering and research, Carboloy Co., Inc.

• **James R. Longwell** has been appointed director of engineering and research, Carboloy Co., Inc., Detroit. During his 15 years with Carboloy, Mr. Longwell has been successively development engineer, chief engineer and factory manager.

• **Howard C. Herbert** has been appointed field engineer for Allis-Chalmers Mfg. Co. in the Pittsburgh district. He was formerly Pittsburgh representative of the I-T-E Circuit Breaker Co. and has also been employed in the engineering departments of the Carnegie-Illinois Steel Corp. and the Gulf Refining Co.

• **Russell M. Richardson** has joined La Salle Steel Co., Chicago, and will have headquarters in their Detroit offices. He was formerly metallurgical engineer and sales representative for American Steel & Wire Co. and for Peninsular Grinding Wheel Co.

• **Elliott Harrington** has been named manager of sales of a newly formed Integral-horsepower, alternating-current motor section of General Electric's Motor Division, Schenectady, and **J. T. Farrell** has been named manager of sales of the direct-current motor section. **D. A. Yates** has been appointed assistant manager of sales of both sections.

• **George S. Tanner** has been appointed manager, equipment sales, National Battery Co., St. Paul, Minn. Mr. Tanner has been associated with National Battery for the past 18 years.

ADAM J. HAZLETT, vice-president in charge of sales, Jones & Laughlin Steel Corp.

• **Adam J. Hazlett** has been elected vice-president in charge of sales, Jones & Laughlin Steel Corp., Pittsburgh, succeeding **Lewis M. Parsons**, director, member of the executive committee, and vice-president in charge of sales, who has resigned. Mr. Hazlett has been general manager of sales of the company for some time. **John W. Reavis**, of Cleveland, has been elected a director of Jones & Laughlin.

• **J. V. Burley**, formerly general manager of sales of the Steel & Tubes Division, Republic Steel Corp., has been appointed manager of sales of the Carbon Bar Division of Republic in Cleveland.

• **B. C. Graves** has been elected executive vice-president of the Union Tank Car Co., Chicago. **J. E. Harley** and **A. E. Gebhardt** have been appointed assistants to the executive vice-president of the Car Service Department. **J. J. Root, Jr.**, has succeeded Abram E. Smith, retired as vice-president and **R. C. Eustice** has been named vice-president and treasurer of the company.

• **James F. McCrory, Jr.**, has been appointed assistant to the president of the O. Hommel Co., Pittsburgh.

• **C. B. Miller** has been elected vice-president in charge of installation, "Automatic" Sprinkler Corp. of America, Youngstown; **C. B. Miller, Jr.**, has been appointed general superintendent, Installation Division with headquarters in Youngstown.

• **W. J. Adamson** has been appointed assistant general manager of carbon steel sales, Allegheny Ludlum Steel Corp., Pittsburgh. Other assistant general managers of sales appointed are **C. B. Boyne**, in charge of stainless, pluramelt and alloy steels; **P. E. Floyd** cutting and tool steels, and **Coolidge Sherman**, warehouse and jobber sales and valve steels.

• **Lawrence F. Boland** has been appointed sales manager of the Beryllium Corp. of Pennsylvania, Reading, Pa.

• **Walter M. Rothschild** has been elected president of the Associated Metals & Minerals Corp., New York, succeeding **Hugo Neu** who has resigned.

• **Robert M. Hayes** and **W. F. Roll** have been elected treasurer and assistant treasurer respectively, of the Oliver Iron & Steel Corp., Pittsburgh.

• **Forest D. Siefkin** has been elected vice-president in charge of industrial relations of the International Harvester Co., Chicago.

• **Dr. Walter M. Mitchell** has been appointed director of research for Mack Trucks, Inc., New York.

• **William Hagel**, manager of machinery sales, **Horace Mager**, manager of roll and steel casting sales, and **Maurice P. Sieger**, chief engineer, have been elected vice-presidents of the United Engineering & Foundry Co. Pittsburgh. **Charles M. Muchnic**, of New York, and foreign sales representative of the company for many years, has been made a director.

• **Dr. Edward U. Condon**, associate director of the research laboratories for the Westinghouse Electric & Mfg. Co., has been elected to membership in the National Academy of Sciences, membership in which is based upon outstanding contribution to the field of science.

WILLIAM J. PRIESTLEY, president, Electro Metallurgical Co.

• **William J. Priestley** has been elected president of Electro Metallurgical Co., Electro Metallurgical Co., of Canada, Ltd., Michigan Northern Power Co., and Union Carbide Co. of Canada, Ltd., units of Union Carbide & Carbon Corp., New York. He succeeds the late Francis P. Gormely. Mr. Priestley became consulting metallurgist for Electro Metallurgical Co. in 1923, and vice-president in charge of sales development in 1932. He was chief of the WPB Alloy Steel Division in 1942.

• **Hugh Martin**, president of the Detroit Gray Iron Foundry Co., has resigned. Mr. Martin's future plans have not been disclosed.

• **Joseph Muncey** has been appointed shop manager of the research laboratory of the Curtiss-Wright Corp. Airplane Division, Buffalo.

• **H. E. Pape** has been appointed director of purchases, The Stanley Works, New Britain, Conn.

OBITUARY...

• **Dr. Frank J. Tone**, pioneer in developing abrasives and refractories and chairman of the board, Carborundum Co., Niagara Falls, N. Y., died July 26. His age was 75.

• **Edmund H. Lunken**, chairman of the board of the Lunkenheimer Co., Cincinnati, died July 19. Mr. Lunken was 83 years old.

• **John J. Klingel**, general superintendent, Buffalo Foundry & Machine Co., died July 15. He was 64 years old.

• **Edgar H. Bristol**, president of The Foxboro Co., Foxboro, Mass., and one of its founders, died suddenly on July 24.

• **Perry F. Garman**, 60, general superintendent, Morgan Engineering Co., Alliance, Ohio, died July 24. He had been employed by the firm 45 years.

Fatigue Cracks . . .

BY A. H. DIX

Our Perspiration, Their Nectar

• • • As in the poem about big fleas having lesser fleas to bite 'em and so on ad infinitum, a great many of the nation's information services live on their fellows. Only about one out of every ten has a spade of its own. The other nine live by diligently sieving over what the spade-wielder digs up.

This is said more in envy than in malice, for the industrial journals, like small-town newspapers, are so placed that they have few to lean on, and so, willy nilly, they must do an inordinate amount of pick and shovel work. We are not complaining, for we are rewarded by seeing the sweat of our brow distilled into nectar to nourish the millions served by the world's mightiest information mill.

A drop that is currently going through the mill is this one from our July 6 "Assembly Line":

> . . . there arises the likelihood that the first reconversion cars will be really brand new cars, not face-lifted versions of the 1942 models.

You will recognize in this an abrupt about-face in automotive predictions. As it is new and startling, the seers have seized upon it. It is echoing through the newspapers and over the air. Your family journal admits to being its father and hopes you will recognize the baby wherever you see it and no matter how fancily it is decked out.

A Matter of Timing

• • • There is, of course, always the chance that the infant will turn out to be a homunculus. The dice do not always come seven even for your favorite family journal. We recall that back in October, 1939, we ran an article entitled, "The Coming Collapse of German Industry," and we are still waiting, although it does look more nearly right now than it has for years.

Turf Note

• • • An anonym has sent us the "Employment Exchange" page of the July 13 issue, which contains a help wanted ad signed, "Reply to Bent Laune, District Sales Manager," and has annotated it, "My candidate for chairman of the greens committee."

Stopper

> Is this slogan that appears on the building of the Manufacturers Screw Products, Chicago a stopper, "Small Parts that End Big Wars"?
>
> —*D. M. Gale*

We rate it excellent as a slogan but hardly passing as an advertising headline. Rarely does the same collection of words serve both purposes. Take, for example, our own modest slogan, "*The World's Greatest Industrial Paper.*" From the view of territory embraced it leaves nothing to be desired, but as an advertising headline it has no more stopping power that a snail on a railroad track.

Explosive Mates

• • • Alexander Woollcott it was who spiced his writings with adjectives coupled with opposed nouns (example, "quietly insane"). As proof that what Woollcott could do we can do we quote the opening words of the July 20 "This Industrial Week:"

> At times resembling an orderly free-for-all . . .

Plug for Foreign Patents

• • • A girl after our own heart is Miss Frederica M. Weitlauf, of the Carboloy Co., Detroit, who says on the "Dear Editor" page (two pages to the right):

> . . . your 'thumbnail sketches' of alien patents is a godsend to anyone interested. Trying to select patents from the titles given in the Custodian's list was so hopeless we gave it up—but we've ordered dozens from your list.

This is what we have been telling you all along, and we are glad to heve someone else carry the torch for a change. The supply of 48-page reprints of the foreign patent series is melting rapidly. If you send in your 30c. in stamps too late to get a copy, you will have only your own teeth to gnash.

Dirge for Two Voices

• • • We would like to join in a duet with an anonymous industrial advertising manager who moans:

> I'm so sick and tired of surveys that prove every magazine is the best one there is that I wish something drastic could be done to stop it. Four surveys are in our files now about magazines in the same field, and each one proves that the others aren't as good as the paper that got up the survey.

He refers to the type of questionnaire you get every now and then from publishers, asking you to name the publications you prefer. We have never gone in for this kind of survey ourselves, believing that when the publisher asks the question the results are apt to be less than convincing. It is too much like a bank cashier making his own audit. He is likely to be more generous with himself than an outsider would be.

And besides, if you ask a reader if he cherishes you above all others, his kindness of heart may cause him to stretch a point.

These are the reason that four separate publications can each prove it is the field's favorite. But if the advertising manager is interested, he can quickly and easily arrive at the truth by sending his own questionnaire to his own customers and prospects. The answer he will get will be true and unbiased. It is the only kind of answer in which we have ever had any faith.

When we attain the Abou Ben Adhem place in an independent survey of this kind, in which neither we nor any other publisher has had a hand, our heart glows with honest pride. Our passion for truth compels us to add that we have frequent occasion to glow, for these surveys usually show us in the star position.

To Mystify the Laymen

• • • A device professional men use to lengthen the distance between themselves and their lay brothers is to employ terms with which the layman is unfamiliar, or if that is not possible, to give a familiar word an unusual pronunciation. Thus surgeons sometimes refer to a breach of flesh as a "wound," to rhyme with "sound," while dentists occasionally speak of "gooms" instead of gums.

Recently we heard General Somervell pronounce *mobile* to rhyme with *noe byle.* We thought it was just an idiosyncrasy of his until a couple of hours later Dr. Elliott, the OCR chief, said it the same way. It is probably a new style in the country's word fashion center.

Aptronym

> . . . One of Zenith Radio's mechanical engineers is George Z. Vernier.
>
> —*C. R. M.*

Puzzles

Last week's philanthropist had $2.20 to give to 28 beggars. Three minutes is par for this:

A merchant visited three fairs. At the first he doubled his money and spent $30, at the second he tripled his money and spent $54, and at the third he quadrupled his money and spent $72, and then had $48 left. How much did he start with?

"FAIRBANKS-MORSE SCALES—ARBITERS OF BUSINESS"

There Can Be No Compromise!

There can be no compromise in any industry where fast, accurate, reliable weighing is a factor.

The decision of the scales must be final and absolute . . . with no tolerance for concessions or adjustments due to weighing inaccuracies.

Fairbanks-Morse Scales more than meet that demand. They are accurate. They are reliable. They have been since 1830—when the first Fairbanks-Morse Scale was built.

Today, Fairbanks-Morse Scales are found in every type of industry. They are used not merely as scales, but as highly efficient production tools that speed operations and eliminate costly errors.

Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.

Buy War Bonds

FAIRBANKS-MORSE

DIESEL ENGINES
PUMPS
MOTORS
GENERATORS
WATER SYSTEMS
SCALES
STOKERS
FARM EQUIPMENT
RAILROAD EQUIPMENT

Scales

Dear Editor:

JOB EVALUATION

Sir:

I remember reading some time ago a very exhaustive article in THE IRON AGE which I believe dealt with the comparison of jobs in one industry with another, with the idea of evaluating those jobs. It seems to me this was within the period of 1934 to 1939. If you could give me any reference to this article, it would be helpful.

L. H. JUENGLING,
Treasurer
Sheffield Steel of Texas,
Houston 1, Texas

● You probably have in mind the two-part series, "Evaluating Shop Jobs By the Point System," by A. W. Bass, Jr., of the Westinghouse South Philadelphia Works, page 42, Sept. 10, 1936, issue and page 58, Oct. 8, 1936, issue. For later articles on the same subject see, "What's Your Job Worth," Aug. 17th and 24th, 1939, issues, a discussion by Prof. H. Barrett Rogers on how to apply a job rating plan, and the two-part series in the issues of Sept. 7 and 21, 1939, by Eugene Caldwell on job rating.—Ed.

TOOL STEEL DIRECTORY

Sir:

Several of our tool makers have requested that this department inquire if you publish a "Directory of Tool Steels." If so, please advise cost.

TED NAGLE,
Director of Sales and Advertising
Sav-Way Industries,
4875 E. Eight Mile Rd.,
Detroit 13

● We do, but our stock of the last edition is exhausted. However, a new edition is on the press and should be ready in a couple of weeks. The price is $1 each for one or a few copies, less for quantities.—Ed.

TOO MUCH "KNOW HOW"

Sir:

The progress of better trade journal advertising is undoubtedly illustrated to best advantage in THE IRON AGE.

While you are digesting this compliment, if you feel a comfortable glow, perhaps you may be moved to do something about a phrase that has recurred regularly in the advertising in THE IRON AGE. The phrase is "Know How." It occurs to the writer that the experts on your staff and on the staffs of agencies placing the advertising, might find a better word to express this "Know How" business. If none of the experts can find a better work or better phrase, you might turn to your readers for help.

CHARLES G. FALLON
630 Centre St.,
Jamaica Plain,
Boston 30

● For instance?—Ed.

PLATING

Sir:

Will you kindly forward us tear sheets of the article entitled "Platers Discuss Industrial Finishing Methods," pages 75-76 of your July 6 issue?

L. N. SODERMAN,
Librarian
Curtiss-Wright Corp.,
Development Division,
Bloomfield, N. J.

● For the second and third installments of this report see July 13th and 20th issues.—Ed.

FOREIGN PATENTS

We are sending 60c. for two copies of your list of metallurgical patents held by the Alien Property Custodian. It is a godsend to anyone interested in these patents. Trying to select patents from the *titles* given in the Custodian's list was so hopeless we gave it up—but we've ordered dozens from your list (we have a very large file of patents).

FREDERICA M. WEITLAUF,
Library and Records
Carboloy Co.,
Box 237,
Detroit 32

SUPERSONICS

Sir:

We note with interest your June 8 (page 60), "Sheet Fractures Detected With Supersonics" and should like to obtain some additional copies, either reprints or tear sheets. If copies of the earlier article in your May 15, 1941, issue can be obtained we would appreciate some copies.

D. RABINOW
Conmar Products Corp.,
140 Thomas Street,
Newark 1

● No reprints were made of the June 8 article but some clippings are being sent to you. Our supply of clippings of the previous article is exhausted but we can furnish photostats.—Ed.

COLD TREATMENT

Sir:

We would appreciate very much your sending us clippings of your March 23 and April 13, 1944, articles on the cold treatment of metals.

P. W. CARR,
Project Engineer
Elastic Stop Nut Corp. of America,
Union, N. J.

BRIGHT PLATE

Sir:

A recent "News Front" mentions "a new bright alloy plate." Where can we get more data?

C. F. DAUM
Reese Padlock Co.,
Lancaster, Pa.

● See page 138, July 13 issue. For further information write to George W. Jernstedt, Westinghouse Electric & Mfg. Co., Newark, N. J., who controls the rights and has developed the process.—Ed.

Sir:

We have been informed from a reliable source that one of the big steel companies is coating steel sheet with aluminum by the "Hot Dip Process," similar to "Hot Dip Galvanizing."

We have been unable to find any articles in the scientific press describing this process.

Has THE IRON AGE published anything relating to such a method of corrosion prevention or do you know of any articles describing it?

B. C. H.

● Some four years ago we published a short item on experiments made by the Crown Cork & Seal Co., Baltimore, using the practice devised by Dr. Colin G. Fink, of Columbia University, New York. We believe Dr. Fink has published a short article on this practice for the Electrochemical Society and will probably be glad to send you a copy if you send a request to him direct. Reynolds Metals has worked on this process also, but the only major producer of hot dip aluminum coatings on steel is the American Rolling Mill Co.—Ed.

NORTHWEST OPPORTUNITIES

Sir:

I have become interested in "Pacific Northwest Opportunities," mentioned in your June 8 "West Coast." Please tell me how I might obtain a copy.

EDWARD J. STUBER,
Ensign, USNR
1320 Kelton Ave.,
Pittsburgh

● Write to the Bonneville Power Administrator Portland, Ore.—Ed.

RUST PREVENTIVE

Will you kindly forward us complete information on the "thin film" rust preventive as described in your June 29 issue.

R. K. THOMAS,
Supt.
Canadian Vickers, Ltd.,
Engineering Division,
P. O. Box 550,
Montreal, Canada

● We suggest that you address your request to the Bureau of Ships, Navy Department, Washington, D. C.—Ed.

WRONG FORMULA

Sir:

In your June 15 article, "Particle Size Determination for Metal Powders," I wonder if the formula explanation and number of particles is correct? Presumably I_0 was meant for 1_A and the conventional π (3.1416) with n being the number of particles. Is this correct?

HERBERT A. LESHER
R.D. 1,
Mohawk, N. Y.

● This is a case of poor proof-reading. I_A should of course have been I_0. π is 3.1416 and n indicates the number of particles per c.c.—Ed.

QUICK-QUENCH FURNACE

Sir:

Your Mar. 9 issue, page 65, has an article, "Speeding Heat Treatment of Aluminum Alloys" and mentions an F. A. Knapp Quick-Quench overhead type furnace. Where is Knapp located.

L. M. FIDLER,
Secretary
The Fulton Co.,
1912 South 82nd St.,
West Allis,
Milwaukee, Wis.

● James H. Knapp Co. is at 4920 Loma Vista Ave., Los Angeles, Calif.—Ed.

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This Industrial Week . . .

- ***War News Not Affecting Steel Order Volume***
- ***Ingot Output Up But Orders Higher***
- ***Quarter Pound Tin Coating on Tinplate Available***

IN the midst of optimistic war news from various fronts the steel industry this week found itself in the tightest delivery situation than at any time since the war began. Although steel ingot output rose slightly this week, this was more than offset by a heavy volume of steel business which has been increasing in the past few weeks. Practically no steel producer this week was able to show a decline in total backlogs.

Postwar planning, while becoming more of a general topic of discussion than it has been at any time heretofore, has affected the steel industry to a minimum so far. Sample orders are not materializing, and inquiries traceable to probable postwar activity have not appeared. Coincident with this is the extreme low point in the number of steel order cancellations. Those which have appeared recently have been more than offset by new orders.

The placement of orders for and the production of shell steel was still the center of attention in the steel industry this week. Production programs involving rails and structural steels have already been pushed back on order books so as to expedite the production of shell steel which is taking vast quantities of semi-finished material. As the shell steel program increases, it is bound to effect cutbacks and curtailments in the production of other less essential steel products. Thus, with good war news ringing in the ears of various industrialists, it may come as a surprise to some that large scale production of even essential civilian items, let alone less essential civilian products, seems this week to be further away than ever. On the other hand, a collapse of Germany would overnight change this situation, according to many steel leaders.

AS far as steel deliveries are concerned certain types of plates are not obtainable until February, 1945, while others may be had in December. Structural steels are being promised by some makers for December delivery and later although this situation might not continue owing to the shell steel program. Strip steels, carbon bars, and cold rolled sheets are being promised as far ahead as February next year, while hot rolled sheet deliveries are being promised for January and February of next year. The alloy steel picture is apparently staging a temporary comeback in view of the tank program as well as replacement parts needed for guns, landing craft and other war materials. Delivery promises among various producers are not necessarily uniform, but this situation is often balanced by weekly changes due to receipt of additional war orders.

Tinplate demand this week was stronger than ever with most mills booked well through to the end of the year. It was reported that deliveries to the West have been held up by a temporary scarcity of railroad cars. Grain shipments in that area have been utilizing practically all available freight cars. The situation is expected to be rectified within the next week or two and mills will be able to resume shipment of tinplate which has been stocked.

Pointed up as a conservation measure for tin, emphasis this week was being placed upon the production of electrolytic tinplate having a tin coating of ¼ lb. for 100 lb. base box. Discussions have been current for some time among tinplate makers towards the production of lighter coatings. As a conservation measure sometime ago, coatings of ¾ lb., and ½ lb. of tin per base box were marketed. With the ¼ lb. coating of tin per base box now possible, this type of electrolytic product may in some instances replace chemically treated blackplate. At least one tinplate maker this week was to have filed with OPA a base price of $4.35 per base box of 100 lb. f.o.b. for the ¼ lb. per base box coating. The established price on the ½ lb. of tin per base box is $4.50 a 100 lb., while ¾ lb. coating per base box electrolytic tinplate is quoted at $4.65 per 100 lb. f.o.b. major basing points.

RECONVERSION thinking in district cities whose labor classification permits civilian goods production is being strangled by OPA ceilings set at prewar levels which fail to account for higher wage rates. Some manufacturers are reported unwilling to resume civilian goods production until assurance is given that relief will be given. Other centers which might be able to resume civilian production on a larger scale are beset by manpower shortages, green help and lack of "know how" among present workers.

This week's national steel ingot operating rate has gained half a point to 96.5 per cent. District gains occurred in Pittsburgh, up one point to 93; Chicago, up half a point to 101; Cleveland, up one and a half to 99.5; Detroit, up four points to 100.5; Cincinnati, up two to 100, and the Eastern district, up 10 to 90 per cent. Operations declined in three steelmaking centers: Youngstown, down four to 87; Wheeling, down two to 96, and the Western District, down three and a half to 89.5. Unchanged from last week are Philadelphia at 99; Buffalo at 104.5; Birmingham at 99, and St. Louis at 106.

•

• **PREPOSTWAR AND POSTWAR IDEAS**—Some of the staff have been asked to put down a few random ideas about major industries and their postwar problems. For some of these industries the prepostwar problems are the same as they will face after the war in Europe ends. Ideas have been obtained from Pittsburgh, Detroit, Cleveland and Chicago. The real answer to these difficulties will come only after Germany is defeated and probably the final answer will not come until the Army and the Navy invade Tokyo.

• **STEEL**—Those steel companies which have had to convert their strip mills to making plates will have a harder

time in the reconversion period than those which have made and are making the same products which were produced in peacetimes. Furthermore, some companies, due to their size and their capacity for heavy steels, have had to make an unduly large percentage of such products on WPB directives while some other steel plants have been able to continue pretty much along the same lines they did in prewar times. For these reasons there is some off-the-record thinking that those companies which converted the least will have the competitive jump on the others—for awhile. It is that "for awhile" which bothers some steel people who have been through price wars in the past. After this war the setup will be different because of the union and because of high wage rates. The latter cannot well be lowered without strikes and strife and with the strong union which exists today it is problematical as to whether the steel companies would be the winner in the long run when some members of the industry might accede to union demands in order to get the competitive edge on other companies.

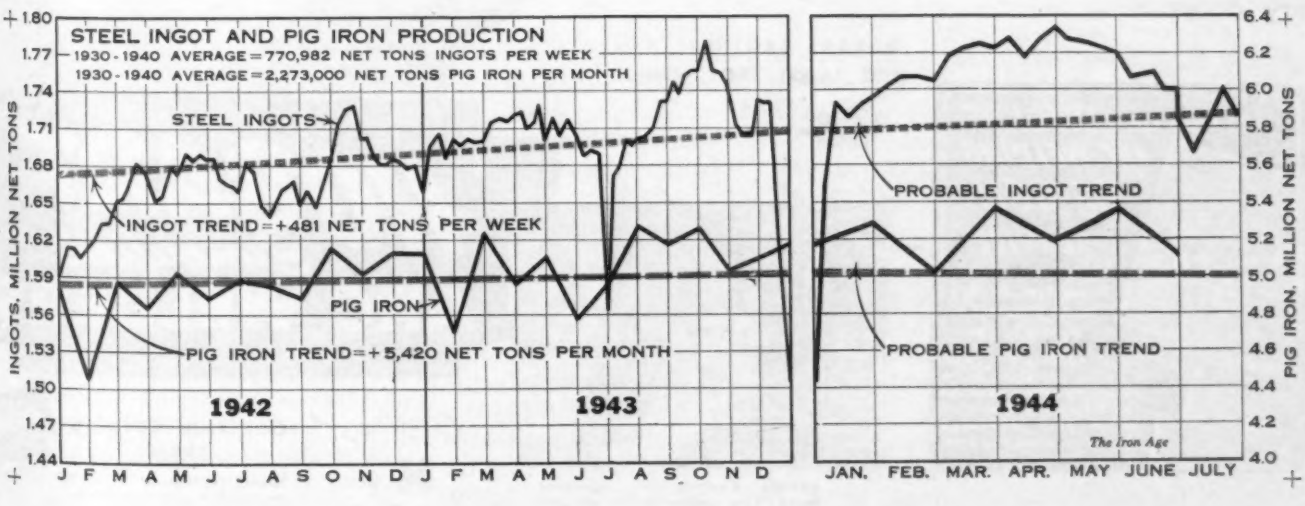
• **AIRCRAFT**—While armchair theorists dream of postwar air transportation in terms of hundreds of thousands of tons of freight handled and unlimited passenger service annually, as well as highy elaborate connecting feeder lines to air transport routes, the aircraft builders are dubious of their postwar aircraft markets. They realize that the productive capacity of the industry cannot be fully utilized in aircraft output alone, and that even with the break of a quadrupled prewar air transportation system with high replacements, aircraft production will have to be drastically curtailed. Competing in world air transportation, the government subsidized airlines of other nations will have a sharp advantage over American airlines in a competitive market unless American lines receive some financial aid. Two unknown factors in postwar aircraft construction are the United States military demand and the foreign market. The demand by the military of this country will call for specific types of planes, but keep plane builders in existence. Other countries may look to the United States for a large part of their aircraft requirements, especially small countries and those now occupied by the Axis Powers. The former never had much in the way of aircraft building facilities, and the latter can expect complete destruction of such facilities by the invading and retreating armies.

• **AUTOMOBILES**—More subcontracting than is customary is being planned by some of the larger elements of the automobile industry for the first run of cars they will produce under WPB authorization. More centralized production of sub-assemblies and components will not follow until larger output totals become authorized and the auto plants are cleared of some of their larger arms commitments. Already many companies have contacted their parts makers to get an idea of manpower, tooling and facilities barriers in the way of deliveries of limited quantities of components. Generally the suppliers indicate that they are prepared to take on the schedules being discussed.

• **MACHINE TOOLS**—The industry is currently sighing a breath of relief caused by the new Clayton SWPA sales policy fog. Government owned surplus machine tools devaluation now will call for 10 to 15 per cent initial depreciation minus 2½ per cent for six months, minus 0.8 per cent per month thereafter. Much incentive is offered present tool users to purchase the tools already in their shops and the government stands to save considerably in moving and storage charges. The policy at present covers only general purpose machine tools. The next hurdle will be to price and find markets for the thousands of special purpose tools in munitions works.

• **FARM IMPLEMENTS**—No returns are yet available as to what types of farm equipment met production goals for the 1943-1944 production season which originally was due to wind up July 31. Some idea of the manufacturing difficulties which recently have been encountered may be gained from the fact that the deadline on harvesting equipment, worst laggard on the list, has been extended to Sept. 30. One harvesting machinery manufacturer is reported to have thrown up his hands at the manpower shortage and conflict with war goods in his own shops and to have returned part of his quota to WPB unfilled. Purchase for components for the overlapping 1944-1945 manufacturing season, which started July 10, has been seriously complicated by direct conflict with the sanctified heavy-duty truck program particularly and tank automotive work generally. Malleable castings still stand out as the number one bugaboo.

The Iron Age



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
July 25	92.0	100.5	91.0*	99.0	98.0	104.5	98.0	99.0	96.5*	93.0	98.0	106.0	80.0*	96.0
August 1	93.0	101.0	87.0	99.0	99.5	104.5	96.0	99.0	100.5	89.5	100.0	106.0	90.0	96.5

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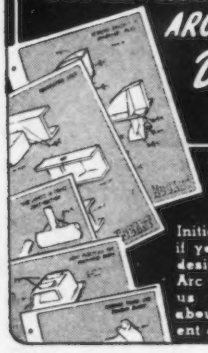

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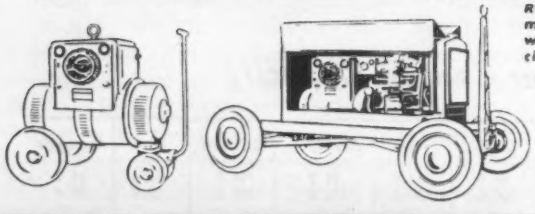

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Wage Increase Case Heard By Panel

By S. H. BARMASEL

New York

• • • **Efforts of the United Electrical,** Radio & Machine Workers of America, CIO, to get a 17c. an hr. wage increase retroactive to Jan. 1; a monthly bonus to meet any rises in the cost of living after Jan. 1; and a guaranteed weekly wage based on a 40-hr. week for the workers of the Westinghouse Electric & Mfg. Co. and General Electric Co. resulted in WLB hearings before special panels in Washington and New York last week.

In New York the union and GE presented their stories to a special WLB panel presided over by Morris Shapiro. Basing their claims for the 17c. an hr. increase on the cost-of-living statistics of the CIO, the union highlighted its case by presenting three wounded war veterans now working at GE.

One of them was asked by the union president, A. J. Fitzgerald, "whether he was a little bit surprised and shocked when he returned to this country at the rise in prices." He replied that he was very much so. "At the time that I left the cost of living was very nice," he said, "but now that the cost of living has gone up so, the wages I make at the present time do not compare with what I made when I left. My wife and I just about make out on our budget and there is nothing to spare with the cost of living as it is now."

Because of the gap between wage rates and cost of living as computed by the CIO, business agents of the various UE-GE locals claimed that there was great dissatisfaction among the workers and that morale was running low. The union seemed proud of its record in keeping the no-strike pledge but its representatives felt that eventually output would be hurt because of anticipated unrest.

Unemployment was already being experienced because of cutbacks in programs as well as transfers to other jobs at less pay, a union official said. The union's solution to this problem as well as a solution to the dislocations that will be brought about by the shift from war to peace production was the guaranteed weekly wage which would give workers a measure of economic security and give to the company incentive for maximum production.

HE WAS SHOCKED: *Wounded World War II veteran Donald V. Surdam (center) looks belligerent after testifying, before a special WLB panel in New York last week. He was "shocked and surprised" at the cost of living in the U. S. Other veterans who testified were Lawrence Curtin (left) and Herbert Dasse.*

o o o

The source of greatest irritation between the union and the company was the settling of an effective date for retroactive pay. The first date set by written agreement was April 7, 1943. Since no new contract was negotiated during 1943, the union said it dropped that date and entered into new negotiations with the company. The union claimed that the date of Jan. 1, 1944, was reached by "verbal agreement," and accused the company of reneging on the agreement.

G. H. Pfeif, supervisor of personnel at GE, and company spokesman said that the Jan. 1 date was asked for by the union since its demands were uniform with those of the United Steel Workers but that the union leaders did not want their members to think they were trailing the steel workers.

During a total war, Mr. Pfeif said, employers and employees must expect a lower standard of living. This is recognized in England and Sweden where it is not expected to peg wages to the cost of living. The company had met the Little Steel formula and in talks with union representatives said that until it was broken, it would not agree to any wage rise.

The union countered by saying that during peacetime a cost-of-living bonus was unhealthy since no American wanted to feel that his standard of living was static. Now, however, under a war economy, the relation between wages and the cost of living must be stabilized by such a bonus plan.

As to an effective date, the company said that it had agreed to Jan. 1 only if the Little Steel formula were broken in the steel case. If the WLB established a later date in the steel case, then that would be the date the company would use.

Earlier in the week the Westinghouse case involving the same union demands was heard in Washington. To give substance to its contention that workers can no longer meet the cost of living, the union called on "typical workers" who told of their difficulties in trying to subsist on their take-home pay.

Chosen as the typical Westinghouse family was Mr. and Mrs. Walter Zach of Irvington, N. J. Appearing with his children, a boy of 5 and a three and a half year old daughter, Zach said that it frightened him to think of what would happen to his family if his weekly take-home pay of $42.50 for 48 hr. of work were cut to a 40-hr. basis. Zach, a third class electrician at the Westinghouse West Bloomfield, N. J., plant said that he had to cash war bonds to pay recent medical expenses and had been unable to save any money in the last two years. Prices of meat, dairy products and clothing had all increased beyond her husband's ability to provide for the family adequately, Mrs. Zach testified.

Also considered typical was John Gorman, another worker at the company's West Bloomfield plant, who estimated that his food bill had gone up 35 to 45 per cent and that he was paying much more for his work clothes and getting inferior merchandise. Because he could no longer afford to keep his car in repair, Mr. Gorman said he donated it to the local scrap salvage committee.

To Lay Entire Problem Of Little Steel Formula Before FDR

Washington

• • • **Announced last week,** WLB's new procedure for hearing wage demands is interpreted to mean that the entire problem of "adjusting" the Little Steel wage formula will be laid before President Roosevelt. That the White House will be asked to pass on the question was indicated by the board's statement that it was "without power" to approve union demands to break the formula.

The board has previously stated that it could not go outside the formula. But the fact that it emphasized the point in connection with its announcement on new procedure and in view of the time consumed in hearing wage demands it was taken to signify that it was preparing to push the vexing problem from its own to the White House doorstep. This would be a natural move if the formula is to have its face lifted inasmuch as only the President can perform the operation. The formula was set up within the framework of the stabilization policy under Executive Order 9328 and it will require Presidential action to amend it. Moreover Presidential action, if taken to change the formula would deprive any single union of credit for the upward adjustment and it is evident that WLB does not want to give such credit to any one union.

There is a prevailing opinion that the formula might be changed to permit wage increases by giving it a new "terminal" while at the same time it would be claimed that this would not be breaking the formula. It has been suggested that the formula might be "adjusted" upward by tying in the present-day relationship between wages and the cost of living as organized labor has demanded. The Little Steel formula allows a 15 per cent wage increase to correspond to the change in the cost of living in the January, 1941-May, 1942 period. The Meany-Thomas report, sharply challenging the Bureau of Labor Statistics claim of a 23.4 per cent rise in the cost of living over the base period, insisted that the increase amounted to 43.4 per cent.

The apparent desire of the board to avoid giving any union credit for an upward adjustment of the Little Steel formula has led to reports that it may segregate the general wage question from other demands and make a report to the President concerning a change in the Little Steel formula, and possibly recommend a change. Demands made in the steel, aluminum, General Motors and other cases, if granted, would necessitate breaking of the Little Steel formula as it now stands. Obviously, wage concessions granted in the CIO-USW steel case would be followed by similar concessions to other unions.

Under the WLB resolution establishing its new procedure a union that has a case pending before the board is given the opportunity "if it acts promptly," to bring to the board's attention any further evidence which it thinks the board should receive before it decides what disposition to make of the request. But the steel and other pending wage disputes, according to the resolution, will go forward without interruption, on the basis of the existing wage stabilization policy. However, in all such cases the parties will be asked to complete their contracts as soon as the board decides the wage dispute with appropriate provision in the contracts for a reopening of the wage question if there is a change in the National Wage policy. This of course throws the doors wide open in the steel and other cases even after decisions are made to grant wage increases over and above that which is allowable under the Little Steel formula in its present form.

Unions are permitted under the new procedure to present to a board agency or panel, for transmission to the board, a simple and concise summary, no more than three pages in length of the nature of the evidence which it is prepared to offer for modification of the Little Steel formula. The agency or panel will transmit the survey to the Director of Disputes of WLB, sending a copy to the other party concerning the dispute. The latter may submit to the board, within 10 days after receipt of the summary, a brief statement of its position and if it so desires a simple and concise summary, no more than three pages in length, of any evidence it is prepared to offer on the subject.

After consideration of the documents so submitted the board will notify both parties of the dispute and the board agency or panel whether it desires to receive any or all of the evidence and what procedure shall be followed in submitting any evidence the board desires to receive.

TOP FLYING GROUP: *Probably the most famous flying group in the Soviet Union is the Guards unit under command of Col. I. Dzusov. From left to right are, Capt. K. Vishnevsky, Lieut. Col. Alexandre Pokryshkin, the outstanding Allied ace of the war, who has shot down* 59 *German planes; Capt. N. Lavitsky, Major G. P. Glinka, credited with* 33 *kills; his brother, Major B. B. Glinka, who shot down* 26; *Col. Dzusov, Lieut. I. I. Babak, with* 21 *planes downed; and Capt. G. A. Rechkalov, credited with* 44 *planes. This unit flies P-39 Airacobras, built by Bell Aircraft Co, Buffalo. More than* 5,000 *of these planes have been delivered under Lend-Lease to Russia.*

Duquesne Blast Furnace Down for Relining Work

Pittsburgh

• • • **Carnegie-Illinois** Steel Corp. blew out its No. 1 blast furnace at Duquesne on July 19 for relining, estimated to take about four months to complete.

The furnace has not been relined since 1929, but was banked but not blown out for eight years during the depression. It was operated from 1929 until November, 1930, when it was banked until April, 1936. In November, 1937, it was banked again until September, 1939. Since that time it has been in constant operation.

One Out of Ten Civilian Skills Among Draftees Used by Armed Forces

Washington

• • • **Less than 100** out of 1000 men considered by 100 large corporations to be their most highly skilled and trained employees drafted into the Army and Navy are being employed at tasks utilizing their civilian skills.

This amazing fact was disclosed by a survey recently completed by the Senate Truman Committee. The Committe requested the companies to furnish the names and addresses of men to be queried, and a letter was sent to each one asking him his military duties.

What conclusion can be drawn from the result of the survey as to the efficiency of military manpower utilization is not clear because it is not known what percent of the men could have found occupations in the Services suiting civilian skills because it is not known how many tasks the Services have which fit such skills. However, the following are striking examples of the square pegs in round holes revealed by the survey:

Because a chemical engineer could type, he was made company clerk. Prior to his induction he was engaged in independent research on synthetic rubber.

A man who has worked on design and development of special electronic equipment for the past 10 years and has been employed by five of the most important firms in the industry was assigned by the Army to slow-speed radio operator school and has succeeded in learning code at 13 words a minute. He wrote: "I would be punished if I repaired equipment I helped develop as a civilian."

A machine shop worker with six years' experience in repair and installation of marine engines is now in the Navy and engaged in painting, ditch digging and carpentry.

A skilled machinist is now playing an instrument in an Army band.

An aeronautical engineer of eight years' tooling and production experience is "onion peeling, floor mopping, dishwashing and cleaning latrines" in the Army.

Upon induction an electrical instrument expert found himself in the Military Police.

Still another draftee who was trained for years in the operation and maintenance of heavy machinery and asked to be placed in Ordnance upon induction, is now being schooled by the Army as a dental technician.

New X-Ray Camera Technique

Wright Field, Ohio

• • • **The AAF Materiel Command** has announced the development of a revolutionary X-ray technique which will allow mass production of 4" x 5" stereopticon X-ray photographs, by the use of a modified, obsolete AAF aerial camera.

Lt. Col. Zolon T. Wirtschafter, formerly a prominent Cleveland physician, and member of the staffs of the Mt. Sinai and Cleveland City Hospitals, originated the idea. Col. Wirtschafter is currently serving as the Chief of Civilian Medicine at Hq. Materiel Command here.

The need for a machine of this type was seen by Col. Wirtschafter last year while he was working 18 hours a day on X-raying the chests of over 10,000 civilian employees at Materiel Command Headquarters. The time and expense of individually inserting and removing the large 14" x 17" standard X-ray films, and the large number of highly trained personnel required to process and develop the film manually, was too wasteful to suit Col. Wirtschafter.

Accordingly, he obtained an aerial camera and set to work on it. By a slight modification of the face and magazine, Col. Wirtschafter was able to obtain X-ray pictures of the highest quality, sixty prints to a roll of film. The pictures could be accurately taken as fast as people could move up before the camera.

The film is processed and printed by motor-driven apparatus that is standard equipment in all AAF photographic units. "The saving of time, personnel, and materials," says Col. Wirtschafter, "is immeasurable."

The benefits of this new machine to the Armed Forces and the civilian population can not be overestimated. The stereopticon effect achieved will give combat surgeons a more accurate picture of the location of shrapnel and bullets.

A NEST OF EGGS: *Yank ordnance men arrange bombs in neat piles at a U. S. Army 20th Bomber Command base in India. The eggs are ready for use in a B-29 fortress raid on Japan. B-29's have the greatest bomb load capacity of any ship in the skies.*

Decentralization of Cutback Controls Already Considered Reality

Cleveland

• • • **Decentralization of** cutback controls is already a reality, THE IRON AGE was told here by Geo. A. Moore, vice-chairman of the Area Production Urgency Committee for Cleveland. These committees work directly under the WPB Production Executive Committee and will carry on the work of this organization having to do with cutbacks in the field.

In addition to placing cutback control on a decentralized basis, this authority also has the effect of removing much of the limitation regarding the size of contracts which will come under cutback scrutiny. Whereas the national committee is limited arbitrarily to surveillance of contracts of $1,000,000 value or greater, the local APUCs will have certain controls over not only all prime contracts but also most subcontracts which may later be affected by cutbacks.

The local APUC groups already have control over all production and construction labor contracts and the acceptance or rejection of all prime contracts on a basis of available facilities and manpower. With the imposition of manpower ceilings and strict referral hiring the APUC can now control even the smallest subcontract providing it requires manpower in addition to the present employment ceiling by asking the WMC Labor Priorities Committee to withhold the labor priority. By the same token any cutbacks which will effect the manpower level of either a prime or subcontractor will of necessity pass through the jurisdiction of the local APUC.

This excepts the cases where the sub employs less than 100 men but includes every instance where the 100-man borderline is approached since employment ceilings are consequently altered.

It was made plain by Mr. Moore that the APUC was destined to become the top local authority on reconversion. He further added that the recent favorable war and reconversion headlines had caused a rush of applicants for releases from the limitations of L and M orders in order to resume or increase civilian production. These appeals are being considered.

In every case the APUC analyzes applications on the following considerations: (1) What decision will help the war effort most (2) can employees be used to better advantage in another war plant (3) should a new war contract be sought instead of reconversion to civilian production?

In many cases, Mr. Moore said, the APUC will seek to bring new war contracts in the critical category into the territory, rather than grant immediate reconversion when a cutback hits, since this would favor the war effort more than reconversion if proper facilities are available.

The committee will actively fight to stave off unemployment of special groups which might be affected by sudden turns in war strategy. This will be done by steering contracts and cooperating with the WMC in referring idle workers to essential new employment.

No major cutbacks can be foreseen in this area at the present point in the war. The cutbacks which have hit here have reduced backlogs in a number of cases but have not yet begun to cause unemployment of either men or facilities.

Board Terminates 10 Strikes

New York

• • • **Of 11 strikes** on the State Mediation Board calendar during June, intervention by the Board terminated 10 and one was referred to the National War Labor Board, Chairman Arthur S. Meyer of the State Board reported recently. All strikes were begun during the month and involved 2172 employees. Of those terminated by Board action, labor won two, involving 225; lost three, involving 1437, and five, involving 447, were settled by compromise. The strike referred to the National War Labor Board involved 63 workers. No strikes had continued from May into June, so the Board entered July with a clean slate as to strikes.

The principle issues in the strikes: Wages, three; discharge, three; union recognition, two; protest against National War Labor Board decision, sympathy, and piece work rate, one each.

The State Board of Mediation also reported 26 threatened strikes, involving 745, averted by Board intervention during June, and settlement of 91 arbitration cases.

Blast Furnace Capacity and Production—Net Tons

Source: American Iron and Steel Institute

	Number of Companies	Annual Blast Furnace Capacity	PRODUCTION							
			PIG IRON		FERRO-MANGANESE AND SPIEGEL		TOTAL		Per Cent of Capacity	
			Current Month	Year to Date	Current Month	Year to Date	Current Month	Year to Date	Current Month	Year to Date
DISTRIBUTION BY DISTRICTS:										
Eastern	10	12,815,680	918,696	5,632,206	18,642	122,569	937,338	5,754,775	87.4	88.3
Pittsburgh-Youngstown	15	26,852,460	2,068,739	12,746,578	16,049	122,834	2,084,788	12,869,412	93.9	95.4
Cleveland-Detroit	7	6,620,500	497,408	3,154,984			497,408	3,154,984	91.6	95.8
Chicago	6	13,575,540	1,059,230	6,670,664		8,780	1,059,230	6,679,444	95.1	98.8
Southern	8	4,822,790	337,763	2,110,228	14,010	82,308	351,773	2,192,536	85.3	91.8
Western	4	2,372,900	126,090	830,469			126,090	830,469	64.8	70.3
TOTAL	35	67,059,870	5,007,926	31,145,129	48,701	336,491	5,056,627	31,481,620	91.0	93.6

During 1943 the companies included above represented 99.5% of the total blast furnace production.

Navy Under Secretary Says Another Year's Work in Shipyards

Pittsburgh

• • • Under Secretary of Navy, Ralph A. Bard told employees of Dravo Corp., and American Bridge Co., shipyard workers that there is enough Navy work to last another year. These companies, engaged in the LST shipbuilding program, along with employees, were given what Mr. Bard termed "a frank statement from the Navy as to what are your future prospects and obligations."

His telegram read as follows:

"As loyal members of the great force which has been mobilized to supply our 'fighting Navy' with the ships and planes and guns needed on the fighting fronts, I feel you are entitled to a frank statement from the Navy as to what are your future prospects and obligations. To put it in one word—it is work—and more work.

"The Navy's production program is still increasing. The last six months of 1944 will show an increase in production of approximately 10 per cent over the first six months of 1944, and the program for the first six months of 1945 will be approximately 3 per cent greater than the first six months of 1944. At the present time, we are short some 30,000 workers in the naval establishments, principally on the Pacific Coast. We expect this production program will be carried out, and it is not expected that the ending of the war in Europe during this period will affect this program. Our battle of production will end only with the defeat of Japan.

"This means that for the next year the Navy must rely upon the civilian employees of its own naval establishments and upon the workers in the private plants and shipyards of Navy suppliers throughout the country to keep our Pacific operations going at top speed; as we approach nearer and nearer Japan, the tempo will increase and the necessity for more and more supplies available at the proper place and time will become more and more vital to our success. We therefore, call upon all such employees, regardless of peace talk and developments in Europe, to stick on their jobs—back up the Navy—and prepare it to pour on the Japanese the cumulative power of our fleet and our production lines—so that the fleet will be effective and our soldiers and sailors will have the necessary arms and ammunition to take an instant advantage of the opportunities which will be presented to shorten this war.

"While our overall demands will show little if any material decrease—there will, of course, be some terminations and here and there cutbacks based upon the changing war conditions. Based upon the program for the year ahead as we now see it, there should be just as many workers employed on the Navy production program a year from now as there are at the present time. The Navy depends upon you—we know you will not fail."

Army Has Six Months Supply

Washington

• • • A high WPB official on August 1 revealed that the Army has more than six months' supply of most military requirements, two years' supply of a great many items and in some cases as much as three years' stock of a minority of items.

The official, who declined to be quoted, also said that "there was some military production of things that the Army never intends to use."

At the same time, Lt. Gen. Brehon Somervell, in a press conference which stressed that production is lagging in heavy trucks, artillery, ammunition, engineering equipment and certain types of bombs, answered charges that there is "water in war production" made by some industrialists in recent months.

"There are two schools of thought on war procurement," said General Somervell, "but we admit that we have made some miscalculations," the General explained:

. "One school thinks that the last cartridges should be plunked into the last Jap. Another school says that we should pile up tremendous reserves to save lives, and that human life is so valuable we should go to any extreme to conserve it.

"We should strive to hit somewhere between the two. I can tell you that production goals are nearer to the latter than to the former."

When asked what message he would like to give the public, General Somervell said:

"We are in the last round. We have shoved the other fellow up into a corner. We have got to have the strength for the knockout blow. This can come sooner if we give the military commanders what they need, when they need it."

INDUSTRIAL TALLY HO! ***Believe it or not these guys with the red hats are not drag hunters doing part time work in a war plant. They are deaf mutes, employed at a Westinghouse Electric & Mfg. Co. plant in Louisville, Ky. The fancy caps distinguish them from other workers in the plant so that they can be warned when the crane bell sounds to indicate that dangerous loads are passing overhead.***

Westinghouse Refunds $5,055,965 To Government after Renegotiation

Pittsburgh

• • • **Westinghouse Electric & Mfg. Co.,** has completed its renegotiation for 1943 with the Navy Price Adjustment Board and has agreed to refund to the government a total of $5,055,-965 in addition to major voluntary price reductions made during the year on individual orders. A. W. Robertson, chairman, said the effect of this renegotiation on 1943 income, after federal income and excess profits taxes, is a reduction in income of $953,732 over that estimated in the company's annual report issued in March. Actual 1943 net income after renegotiation is $21,401,568.

"Although production exceeded any other six months in the history of the company," Mr. Robertson said, "one of the most important items to receive attention has been the termination of war contracts, which is coming more and more to the forefront in all business engaged in war production.

In June, 1944, the number of open, unsettled terminations increased from 446 to 521, while the book value involved decreased from about $108,-000,000 to $94,000,000. In the same month, 286 new terminations involving some $9,000,000 in booking value were received.

Orders during the first six months of 1944, while at a high level, were off slightly from the same period during 1943. To June 30, 1944, orders totaled $446,031,899 compared with $473,631,033 for the first six months of 1943. Sales billed during the same period were higher than last year. Sales to June 30, 1944, were $395,564,-740, while those of the corresponding six months period of 1943 were $320,-105,295. Net income for the first six months of 1944, after adding postwar refund of excess profits tax and deducting sums set aside for postwar contingencies, was $10,470,701, as against $9,039,888 for last year's period.

Labor Market Is Organized Under WMC Priority Referral Program

Washington

• • • **Paul V. McNutt,** chairman of the War Manpower Commission, has announced that preliminary reports on the WMC Priority Referral Program, introduced July 1, indicate that the labor market is being organized so that available workers are directed to jobs in the order of their importance to the war effort. The announcement was based on preliminary reports for the week ended July 15 from 43 areas representing all sections of the country.

During the week of July 15, offices in the 43 areas sent 77,000 workers to firms producing essential war goods or services, an increase of 15,000 or 24 per cent over the 62,000 sent during the week ended June 10. Chicago, Ill.; Houston, Texas, Sacramento, Calif., and Rome, Ga., were among the areas reporting the largest increases in the number of workers accepting referral to essential establishments. In the labor shortage areas reporting, referrals to essential employment increased 20 per cent, as compared with an increase of 32 per cent in areas where labor supply is adequate.

The preliminary reports also indicate a sharp increase in the referral of workers from labor surplus to labor shortage areas, largely as a result of the increased number of workers applying for jobs at WMC's United States Employment Service offices, Mr. McNutt said. The 15 labor surplus areas from which preliminary reports were received were able to refer 3,600 workers to jobs in other areas urgently in need of workers, an increase of 19 per cent over the week ended June 10. One person out of every 10 referred to jobs in these areas was referred to other areas on high priority orders.

No information is available as yet regarding the trend of employment in the essential establishments. Such reports will be available shortly.

"The preliminary results of the priority referral program," Mr. McNutt said, "appeared to demonstrate that we are now in a better position to expedite the orderly placement of workers in jobs where they are most needed. This is a big step forward in the handling of the manpower problem and will undoubtedly help to bring about desired results in production of war goods and extension of essential services."

Westinghouse Electric & Mfg. Co. Orders, Backlogs, Taxes, and Income

	SIX MONTHS ENDING			TWELVE MONTHS ENDING		
	June 30, 1944	June 30, 1943	Per Cent Increase, 1944	June 30, 1944	June 30, 1943	Per Cent Increase, 1944
Orders booked	$446,031,899	$473,631,033	*6	$931,367,923	$1,052,084,969	*11
Orders unfilled, less held and terminated orders	767,125,246	880,316,653	*13	767,125,246	880,316,653	*13
Sales billed	395,564,740	320,105,295	24	784,802,162	592,482,627	32
Income before federal taxes and postwar adjustments	56,600,096	43,425,471	30	112,237,819	84,917,108	32
Income tax	$ 4,894,873	$ 5,198,329		$ 10,133,219	$ 9,982,884	
Excess profits tax	41,885,855	29,054,696		80,012,913	55,338,350	
Total of above taxes	$ 46,780,728	$ 34,253,025	37	$ 90,146,132	$ 65,321,234	38
Net income before postwar adjustments	9,819,368	9,172,446	7	22,091,687	19,595,874	13
Add: Postwar refund of excess profits tax	4,188,585	2,905,469		8,001,291	5,533,835	
Deduct: Provision for postwar contingencies	3,537,252	3,038,027		7,260,597	6,428,527	
Net income	$ 10,470,701	$ 9,039,888	16	$ 22,832,381	$ 18,701,182	22

* Decrease.

Nation Faces Huge Postwar Salvage Job on Government Plants

Washington

• • • A **$4,000,000,000 wrecking** and salvage job of government-owned plants that nobody will have any use for after the war may possibly face the nation, according to a WPB estimate made public by OWI this week.

WPB estimates that $5,000,000,000 worth of plants will be needed by the Army and Navy for standbys, and that $6,000,000,000 worth can be sold to industry out of the $15,000,000,000 worth of industrial facilities estimated by the Baruch-Hancock report to be surplus after the war.

The plants which are expected to stay on the shelf won't be wanted. WPB said, because of poor convertibility and lication. In this category are ammunition and explosives plants, placed in out of the way interior locations for strategic reasons.

It naturally follows that if the government doesn't want these plants and that industry is not expected to, the most colossal wrecking and salvage job in history will have to be done to recover even a small part of the federal investment. WPB said that military construction valued at $10,000,000,000 will not bring more than 10c. on the dollar. This construction consists chiefly of camps, airfields and warehouses.

Only about $9,000,000,000 in other surpluses will have to be sold in this country, SWPA has estimated. This figure excludes foreign surpluses, food, military construction, plants that the goverment will maintain in standby condition or convert for other government purposes, stockpiles to be retained, and peacetime needs of the Army and Navy.

Thus the $50,000,000,000 to $100,000,000,000 surplus estimate previously made by government officials seems to have been too high, according to the most recent surveys.

WPB estimates that a market will be sought for the following surpluses in this country: war housing, $1,000,000; Army and Navy equipment, $4,000,000,000; government stockpiles, $1,000,000,000 and items in manufacturing inventories, $3,000,000.

Industrial surveys of all war plants which may become surplus are being made by RFC, OWI said.

RFC reported to SWPA Administrator Will L. Clayton that:

"In brief, we propose to take each plant in various fields such as aluminum, magnesium, alcohol, etc., and determine what reduction in costs, what new or cheaper sources of raw material power, etc., what new outlet for its product, what supplementary facilities, what improvements in transportation and its cost, will be required to enable the plant to justify itself in the postwar market.

"With respect to the steel plant at Geneva, we are going into prewar current and potential demand for steel products in the western area and are continuing our endeavor to lower transportation costs so that the plant might be adapted to products that it can market economically.

"We are also authorizing current research with respect to magnesium and with respect to alloying of magnesium and its fabrication. In cooperation with WPB, we are arranging to send a representative each from WPB, DPC, and Basic Magnesium, Inc., to England to obtain information not available here relative to magnesium fabrication."

RFC announced on July 26 that it had on hand surplus property worth $181,442,667 and of this amount property costing $59,004,006 had been sold for $52,562,554 more than a $6,000,000 loss.

RFC reported the following selected stocks on hand as of July 15, together with information on cost and sale prices:

Product	SALES		On Hand July 15
	Cost	Selling Price	
Aluminum ores and scrap	$ 1,020	.....	$ 1,020
Steel	42,528	$36,752	887,294
Ferroalloys	13,500	.....	13,500
Other non-ferrous metals	13,340	8,488	755,647
Aluminum ingots	97	.....	97
Fabricated basic products	241,656	.....	241,656
Electrical apparatus	348,206	.....	348,206
Special machinery	109,786	.....	109,786
Metalworking machinery	656,994	.....	656,994
Miscellaneous machinery	76,228	.....	76,228
Airplanes	130,500	25,000	60,037,497
Industrial plants—real estate	500	200	60,500

WPB Makes Tools and Equipment Available Despite Service Opposition

Washington

• • • **Despite Army and Navy opposition,** tools and industrial equipment which will have much to do with preventing unemployment in the postwar period were made available for the manufacture of civilian goods by WPB on July 30. This reconversion order is Priorities Regulation 24.

Manufacturers are permitted to place unrated orders for 15 types of capital equipment, subject to prior approval by WPB regional offices. The field offices will try to fill requirements from surplus equipment wherever possible. WPB says the government owns one-fourth of the 1,700,000 machine tools now in use.

However, manufacturers may reject used equipment if it will take too long to find it, wherever it is not in condition, or the price of the old tool is so high, it would pay to order a new item on an unrated order.

Preference ratings may be secured by manufacturers wherever circumstances merit their assignment. A typical case is where inability to procure equipment would cause extended and needless unemployment. In such an emergency, to justify the issuance of a preference rating, it must be shown that no surplus equipment is available, and the assembly line cannot wait for the equipment manufacturer to fill an unrated order without causing serious unemployment.

No new equipment order can interfere with approved military or essential civilian schedules, but so long as these schedules are met "chinking in" production may be permitted. The provisions of Priorities Regulation 1, governing the sequence of filling orders, must be complied with, however.

Factory equipment other than machine tools for which orders may now be placed include: Precision measuring instruments, amsting machines, foundry equipment and metal melting furnaces, elevators and escalators, electric motors and generators, conveying machinery and mechanical power transmission equipment; general industrial equipment, portable conveyors, electric motor controllers, resistance welding equipment, oxy-acetylene apparatus, lubricating equipment, container machinery.

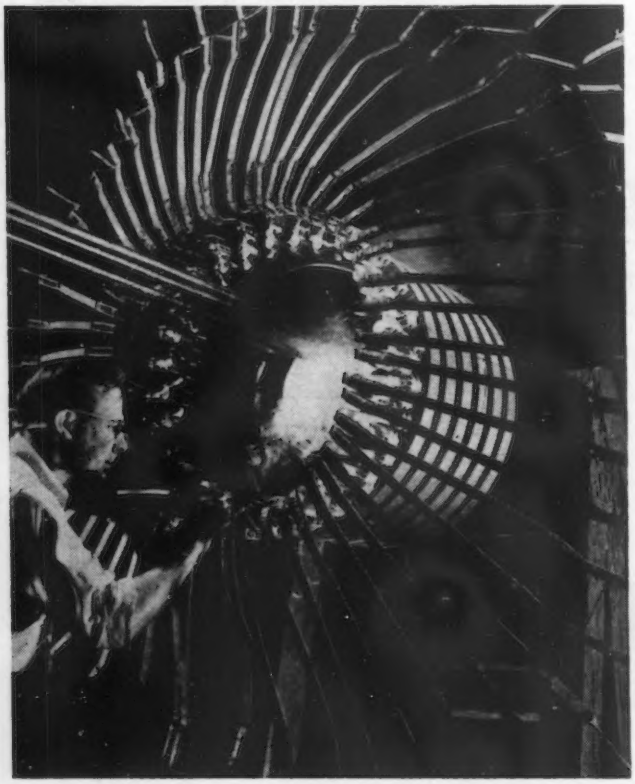
WPB's approval of the placement of an unrated purchase order for tools or machinery may be obtained by writing a letter to the nearest WPB field office. The letter should indicate size, type, make and approximate price of the equipment wanted and be in triplicate.

If no suitable existing equipment is available from idle or excess stocks, the WPB field office will give its approval of the placement of unrated orders on form G.A. 1977. Applications for preference ratings should be made on form WPB-1319.

Unexpected demand this year by the Army and Navy for heavier trucks, artillery, ammunition, airplane engines and tanks, raised production sights for 1944 from $325,000,000 predicted in September, 1943, to more than $476,000,000 in shipments this year, WPB says.

In December, 1943, there was an order backlog of $210,000,000 less $18,000,000 which was later canceled. But orders for $264,000,000 worth of tools were received in the first six months of 1944, with shipments of $283,000,000 made.

About 250 prewar companies are producing 90 per cent of military requirements. These companies are only about 80 per cent engaged because of a manpower shortage. Seventy companies which turned to the production of shells, airplane engine parts, bombbays and radio and radar when the big cutback in tools production came in 1943, have probably permanently abandoned machine tool production.



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SPIDERWEB: *A worker solders armature connections on a collector for a synchronous converter in the East Pittsburgh works of the Westinghouse Electric & Mfg. Co. The copper "threads" of the collector spread out to gather in electricity to a central point where it is changed from alternating to direct current.*

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DPC Authorizes Contracts

Washington

• • • **Defense Plant Corp.,** RFC subsidiary, has authorized the following contracts:

Higgins Aircraft, Inc., New Orleans, to provide additional equipment at a plant in New Orleans at a cost in excess of $1,300,000, making a total commitment of more than $31,000,000.

Revere Copper & Brass Inc., New York, to provide additional plant facilities at Baltimore, at a cost in excess of $950,000, making a total commitment of more than $7,750,000.

Stewart Bolling & Co., Inc., Cleveland, to provide equipment at a plant in Cleveland at a cost in excess of $150,000.

Plastic & Rubber Products Co., Los Angeles, to provide equipment at a plant in Dayton, Ohio, at a cost in excess of $90,000.

Davis Engineering Corp., Elizabeth, N. J., to provide equipment at Elizabeth at a cost in excess of $40,000.

RFC to Assume Responsibility For Disposal of Government Surpluses

Cleveland

• • • **Reconstruction Finance Corp.** and its subsidiary the Metals Reserve Corp., will take over major responsibilities for the disposal of surplus government owned property by late August or early September, according to information obtained here by THE IRON AGE. At about the same time the Redistribution Division of the War Production Board will sing its swan song and bow out of existence. Much of the footwork already accomplished by the WPB redistribution branch and possibly some of its personnel is expected to be taken on by RFC.

Of five agencies to be designated as disposal agencies the RFC is by far the most important to heavy industry. Under its jurisdiction will fall the disposal of capital and producers' goods including plants, equipment, materials, scrap and miscellaneous property. While RFC holds the parent responsibility for such disposal, most of the details are expected to be handled through the Metals Reserve Corp., its subsidiary.

Other disposal agencies will be the Procurement Division of the Treasury Dept. handling consumer goods; the Maritime Commission for ships and maritime property; the War Food Administration handling food, and the Foreign Economic Administration to sell all property existing outside the United States. These disposal agencies are set up by the Surplus War Properties Administration.

To avoid the delay of transferring title from the contractor or procurement agency to the ultimate disposal agency, every effort will be asked of the procurement agencies to dispose of all surplus property either to or through the contractor within the shortest possible time and preferably within 60 days.

Sales to or through the contractor are to be made with the approval of the contracting officers. These policies apply to property owned or in the custody of the contractor or subcontractor and for which settlement claims have been filed. They do not apply to completed articles deliverable to the government or to machinery and other capital equipment. These categories, if surplus to the procurement agency, must be transferred to the proper disposal agency. Prices in any case are controlled by the limits established in SWPA Reg. 1 and must conform with OPA and WPB regulations.

The decision to scrap semi-finished material as a means of disposal will fall upon the procuring agency. SWPA is expected to set up regional consultants in the disposal agencies to aid contracting officers and review boards in making such decisions. Scrap sales will be on the basis of the going prices or, failing this, bids will be called for. The contractor has the right in listing surplus material resulting from termination to list all material or segregate and lump lots as scrap in accordance with Army Procurement Reg. 7 limitations.

In the case of small quantities resulting from small terminations, goods may be sold by procurement agencies at the highest price obtainable providing the claim does not exceed $10,000. Regardless of the value of the claim, small lots not having a value of more than $1000 can be sold at the same liberal terms.

Great emphasis is being placed upon "market testing" as a means of justifying the sales price of surplus materials. "Going" prices to be established by market testing are expected to be ascertained through reference to trade paper price authorities, inquiry among government agencies, dealers and other informed sources. The WPB Redistribution Branch will also aid by making market checks through its publication, *Redistributor*.

Procurement agencies will also sell raw materials at the going market price if in commercial lots and a market price can be determined. If this cannot be done, the materials will be turned over to the disposal agency for sale.

Other usable property may be sold by the procurement agency at the best price obtainable above 75 per cent of either its cost or price through a normal source. Sales may be made to anyone whether a consumer or not providing the buyer agrees to consume it within the U. S. or not to resell at a profit. This to avoid speculation.

The WPB Redistribution Branch, however short its future may be, has not been taken out of the picture immediately. The Army, Navy and Maritime Commission have agreed to let this branch act as their sales agents for surplus property prior to the time when transfer to a disposal agency is required. It is thought that WPB will make all sales for these procurement agencies that are possible and perform the market testing and inventory work until such times as the stocks fall into the categories requiring the transfer to a disposal agency.

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SOUVENIRS: ***Deputy customs collectors in Baltimore, Md., examine a collection of souvenirs sent back home by military personnel in all parts of the world. Some 1,000 packages containing every kind of fighting front souvenir from live snakes to machine guns pass through the Baltimore customs daily.***

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Wartime and Postwar Problems To Feature SAE Discussion Group

New York

• • • **Comprehensive engineering** discussion of wartime and post-war technical problems of land and air transportation will feature the SAE National West Coast Transportation & Maintenance Meeting to be held August 24 and 25 in Hotel Multomah at Portland, Ore., it has been announced by SAE General Manager John A. C. Warner.

Tentative program for the meeting, one in a series of wartime engineering conferences being held by the Society of Automotive Engineers for dissemination and discussion of war-developed technical data, will be concerned with wartime maintenance of motor trucks, buses, and air cargo planes, and with fuels and lubricants used in commercial transport vehicles. The tentative program brings the postwar into focus with technical papers on future design of engines, and studies of land and air-borne transportation of passengers.

J. Verne Savage, superintendent of Automotive Equipment, City of Portland, is general chairman of the meeting, which is sponsored by SAE Transportation & Maintenance Engineering Activity, with SAE Oregon, Northwest, Northern California, and Southern California Sections cooperating. Among the speakers will be Ellis W. Templin, of Los Angeles, Calif., SAE vice-president for Transportation & Maintenance Engineering; and J. E. Badley, of Portland, chairman of the Oregon Section.

Technical papers tentatively scheduled include:

"Possibilities of Gasoline Engine Development," by F. S. Baster, engineering vice-president, White Motor Co., Cleveland, Ohio.

"A Solution of Present-Day Fuel Problems," by W. H. Paul, professor of automotive engineering, Oregon State College, Corvallis, Ore.

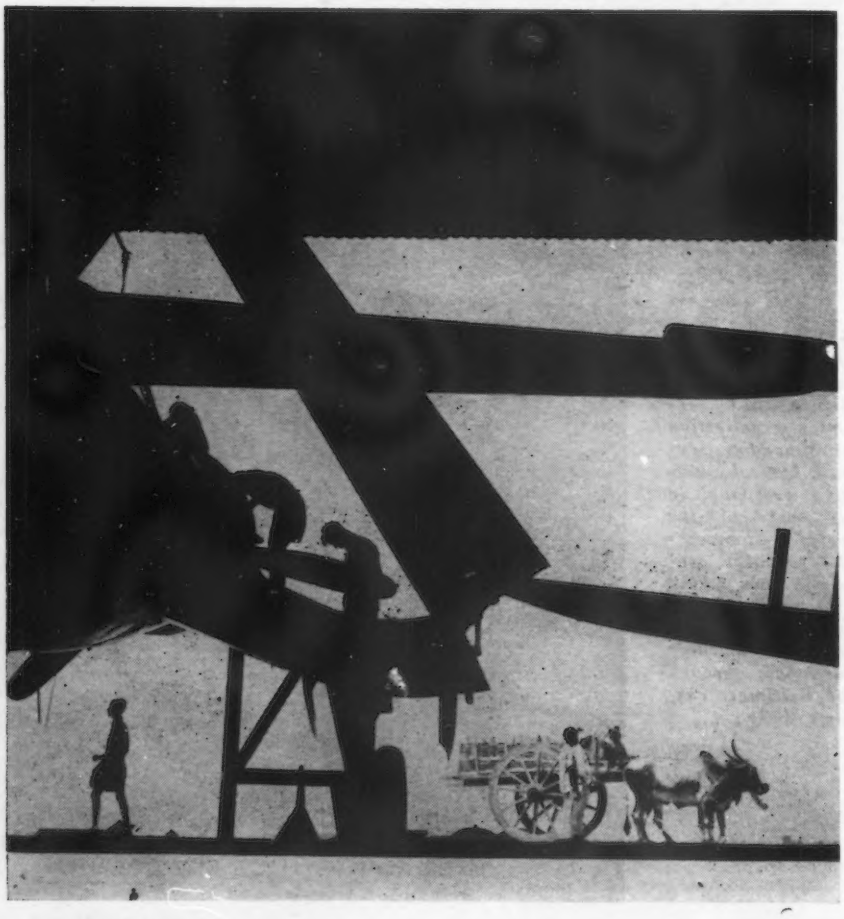
"Relation of Lubrication and Filtration to Engine Life," by C. N. Bentley, of DeLuxe Products Corp., LaPorte, Ind.

"Air Cargo; a Problem Between Carriers on the Ground and in Flight," by R. D. Kelly, United Air Lines Transport Corp., Chicago, Ill.

"Postwar Expectations and Possibilities of Air-Borne (Helicopter) Bus Service," by Agnew E. Larson, of Rota-Wings, Inc.

"Surface Buses of the Future," by W. W. Churchill, superintendent of operation and maintenance, Washington Motor Coach Co., Seattle, Wash.

EAST MEETS WEST: *The contrast between the old and the new is strikingly portrayed in Ceylon where natives haul wood for hangers in carts drawn by oxen. In the foreground, British air crewmen work on a U. S. built Vought Corsair.*



Steel Industry Has Great Manpower Need for Production

Washington

• • • **Steel works, blast** furnaces and coke ovens need men desperately to meet their war production schedules, President Eugene G. Grace of the Bethlehem Steel Co. last week told WMC Chairman Paul V. McNutt.

"The entire steel industry needs men right now for essential steel production work, including open hearth, blast furnaces and coke oven operations," Mr. Grace told the WMC Chairman.

Mr. McNutt said steel works can use only a limited number of women because of the nature of the work to be done. A study of the labor situation in steel works has shown that all men in the present emergency have an opportunity to work at least 48 hr. a week and that many in critically-needed capacity are working a full seven-day week. Wage rates are among the highest in American industry.

The greatest need of the steel producers is for unskilled and semi-skilled labor. There are jobs open in every principal steel center in the country, with placements being made at plant employment offices through arrangements with WMC's USES.

Phillips Appointment

Washington

• • • **Ed P. Phillips, construction** equipment engineer, has been appointed Director of the Construction Machinery and Farm Equipment section of Treasury's Surplus Property Division. Mr. Phillips is a native of Richmond, Va., and is the senior partner of Phillips Machinery Co., with offices in Richmond and Washington.

Large Order Placed By War Department For Hospital Cars

New York

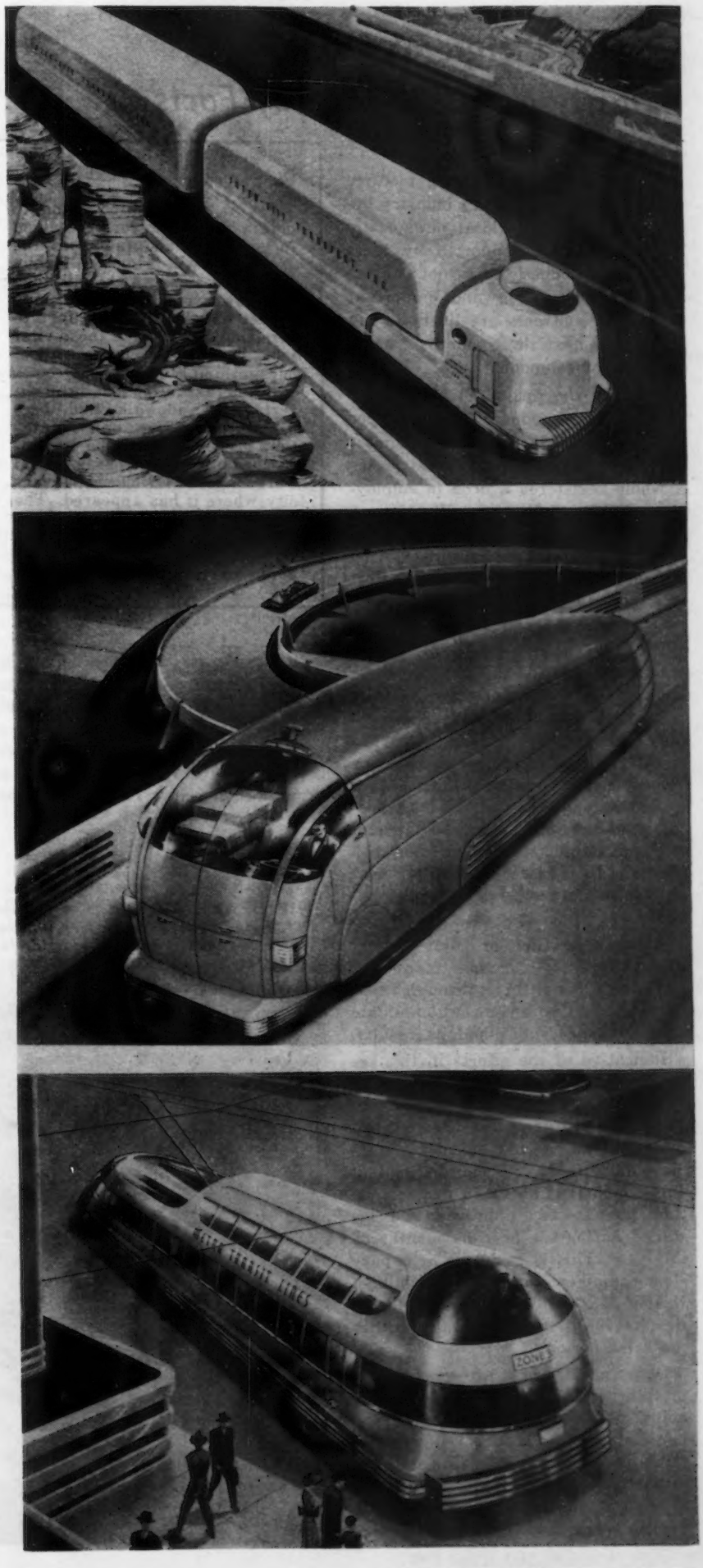
• • • **The order recently** placed by the War Department with American Car and Foundry Co. for 100 hospital cars to be placed in service as soon as possible is another example of the sound planning for the comfort of the men in the armed forces.

Unlike the hospital cars that have already been provided, these new cars are being designed and built "from the wheels up." The former cars were converted passenger and Pullmans but due to the increased war travel no additional cars could be spared for conversion so these cars will be "tailor made," and in every respect designed and built for the important service they are to render.

Like their predecessors, the Troop Kitchen Cars, also built by acf, these hospital cars will be more efficient for the job. As the invasion casualties reach the shores of the United States these cars will provide comfortable space for 36 patients, 30 for wounded and six for mental and shock patients.

There are two roomettes in each car for the medical staff and a complete kitchen to provide special diets and general feeding of the patients. This kitchen is equipped with a cooking range, refrigerator, sterilizer and ample closet space for storing provisions. There are two toilets and a shower bath for the comfort of the passengers. The reception room on each car is provided with four-foot doors so that patients can be moved in and out with the utmost comfort and speed for the movement to the hospitals from the debarkation ports. There is ample baggage and locker space for storage and finally the cars are completely air-conditioned and will use the acf ice-activated system.

Compared to the former type of car which provided for only 24 patients and four mental cases, the new cars are the last word in comfort for the injured. They are to be built at the acf St. Charles, Mo., plant.



SHAPE OF THINGS TO COME: *At the top is the artist's conception of a postwar intercity trailer truck which may be the answer to cross country hauling. In the center, the future inter-city truck rounds a turn. At right the dream trolley coach of the furture suggests a driver's compartment on the upper deck, a sky view, a roll back roof and other wonderfull things.*

Gloomy Picture of Foundry Industry Not Supported by Facts

Cleveland

• • • **Dark and foreboding** pictures of the forge and foundry industry being drawn here by local newspapers are not entirely supported by facts although production is not up to necessary schedules and important munitions contracts are likely to lag within the next three months from a shortage of components.

Actually the forge and foundry industries here produced about one per cent more in June than May in most categories although the industries as a whole registered a drop in employment. WPB officials from Washington recently sighed that a drop of about 20 per cent could be expected during the hot months unless every effort was made to offset such a fate. "Every effort" seems to be working despite forebodings.

Gray iron and malleables both showed about a one per cent increase in output for June compared with May although steel castings dropped slightly. The WPB reports that personnel, despite all efforts, has not picked up appreciably but that scheduling and rushing in new equipment has kept output at near an even keel. The hoped for increase of 10 per cent is just as far away as ever, it appears.

Better scheduling of "first" orders first, efforts to increase manpower utilization and rushing through needed equipment to somewhat eliminate manpower needs has had its results.

Indicative of the efforts in this regard, the local WPB reports that about $410,000 in vitally needed mechanical equipment has been rushed into both forge and foundry plants here during the 12 months ending July 1 and that about 75 per cent of this amount was approved and installed during the first six months of this year. This is exclusive of expansion equipment and new buildings. Nearly $6,000,000 in expansion facilities has been granted locally within the same period.

Ohio and Michigan are the nation's most critical states from the standpoint of foundries. With only nine per cent of the nation's population these two states are responsible for approximately 35 per cent of all foundry production. Records of recent months show that foundry manpower in the two states has been decreasing on an average of about 4.5 per cent per month. This total appears likely to improve to a decrease for July of only about 1.5 per cent but Cleveland's rate of drop remains serious at about 4.4 per cent. The state of Ohio employs about 40.000 in foundries and forge shops and needs about 3500 more men immediately. Michigan reports a need of about 3700 for a total of 7200 for the two states.

Effects are already being felt in the heavy truck program which is thought to be from 20 to 25 per cent behind schedule due to a shortage of components. White Motor Co. here is facing a parts crisis which seems sure to slow production very soon. Other programs which are vital to the war and which will suffer from forged and cast component shortages within the quarter include: Tanks, landing craft-tanks, airborne tractors, bulldozers, submarines and landing craft, winches, certain new aircraft and sections of the heavy artillery and shell program.

Cleveland

• • • **As a last ditch stand to obtain workers for Cleveland forge plants and foundries the WMC here will bring in a mobile recruiting unit which will tour all known spots where idle men collect and loaf in an effort to persuade men to take these vital jobs instead of chalking pool cues or simply idling.**

Kenneth F. Ermlich, who directs the sidewalk and beer parlor recruiting unit, states that use of this method has increased the flow of potential workers to USES offices in every city where it has appeared. The unit has worked its way north from Birmingham as far as Dayton, Ohio, and is expected here sometime this week.

IBM Shows Net Profits

New York

• • • **Net profit of International** Business Machines Corp. and subsidiaries for the six months ended June 30, 1944, as reported recently, was $19,045,517 before provision for U. S. Federal and Canadian income and excess profits taxes. It compares with net profit of $17,367,473 for the corresponding 1943 period, an increase in net profit before taxes of $1,678,044, or 9.7 per cent.

THE HEAT'S ON: *Billows of smoke rise from a Jap pillbox on Saipan as a Marine flame throwing tank turns on the heat. Note lone Leatherneck watching the procedure from his ringside foxhole in the foreground.*

WLB Introduces Five-Point Program to Cure Manpower Shortages

Washington

• • • **Listing them as** the number one bottleneck in war production the National War Labor Board has put into effect a five-point program to help cure the manpower shortage in gray iron, malleable and steel foundries. This, the board said, will be done "in keeping with the board's duty of adjusting inequities as far as possible within the limits of the wage stabilization program." The problem was said to be most acute in relation to foundry labor and other relatively unskilled occupations and was attributed in part to an unsatisfactory wage situation.

The WLB five-point program, worked out in cooperation with the WMC, WPB and other Governmental agencies follows:

1. Voluntary and dispute cases to be processed by regional boards with the utmost dispatch and if necessary given preferential treatment. In complicated cases now pending, which cannot be processed at once, interim orders to be issued dealing with the most acute aspects of such cases.

2. In areas with no stabilized rates, foundry brackets to be based on the rates now paid in foundries, taking into account that traditionally foundry labor has been paid somewhat higher rates than are paid for common labor in most other industries.

3. In determining foundry brackets and processing foundry cases, attention will be paid to the avoidance and correction of inequities in the rates of classifications involving approximately the same degree of skill.

4. Employers and unions interested in the establishment of sound incentive plans will be advised that they can get assistance in the development of such a plan from WPB.

5. Production agencies of the Government will report to Edwin E. Witte, public member of the board, all foundry cases as to which they deem particularly speedy action to be necessary.

Capricious Strikes Hamper Program

Cleveland

• • • **The wave of "wildcat" strikes** predicted almost at the close of D-day in Normandy by THE IRON AGE has begun to materialize here on a critical scale. At this writing more than 4100 workers from three plants vital to the munitions program are on strike here and several other strikes of the past week in nearby areas are just drawing to a close. The petty trivialities causing these strikes are plain indications that they are being used as weapons to force union gains from management and the government before V-day wipes out this "bargaining" advantage for the unions, labor observers indicate.

Ohio Crankshaft Co. of Cleveland, has 3000 out because two inspectors would not accept identical jobs in another part of the plant. Fired for insubordination, this sanction brought a plant-wide strike. The product is aircraft engine crankshafts most of which go to Wright Aeronautical in Lockland (Cincinnati) Ohio.

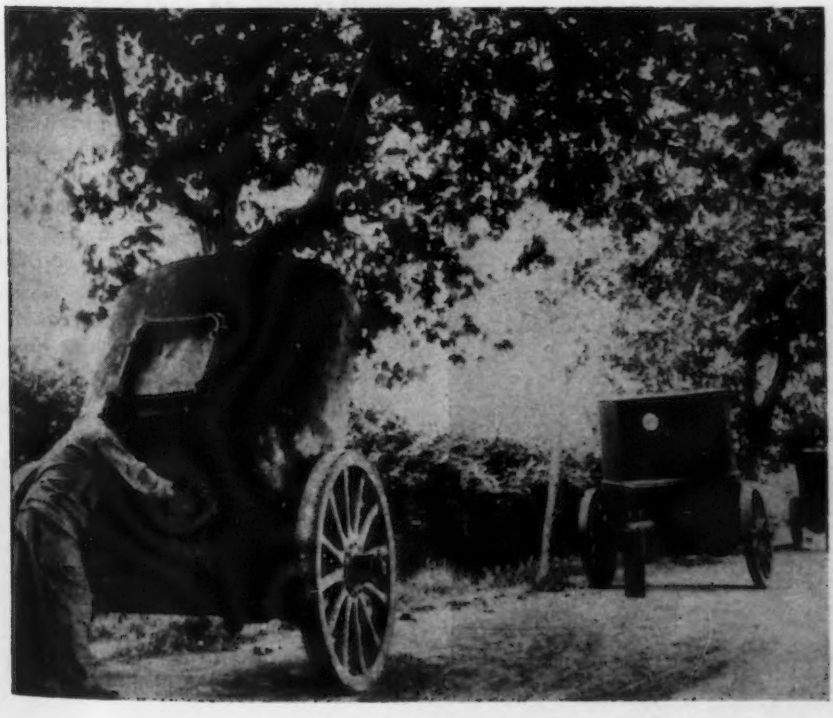
The curse of war losses from this strike was somewhat mitigated by the fact that the Wright plant was also on strike. However, the Wright Aeronautical plant has now returned to work and is certain to suffer from critical component shortages within the next few weeks despite any crankshaft inventories it might have had. The Wright union misunderstanding was too confusing and quickly altered to suit the union's case to be describable. Main bone of contention was the dismissal of union stewards due to earlier strife. Between 2500 and 7000 workers have been idle on and off in two major strikes there since D-day.

One of the most critical component bottlenecks in the war effort was further aggravated here by a strike of 1100 at National Malleable & Steel Castings Co. This was a wage dispute over a raise some got and others didn't in this plant.

McKinney Tool & Mfg. Co., here, also added another 100 idle to the list through an unauthorized strike lasting most of last week. Firing of one man precipitated the walkout.

Recently settled but also recently active in hurting the war effort in this region were strikes at Centrifugal Fusing Co., Lansing, Mich., making Super-Fortress landing wheels and out of action for seven days; a ship building company at Toledo, settled overnight; Packard Motor Car Co., of Detroit, maker of the Rolls-Royce engine, and a walkout at the American Rolling Mill Co.'s Ashland, Ky., plant.

PILLBOX WHEELCHAIR: *A Yank, serving with the Allied forces in Italy, examines a Nazi pillbox on wheels. The curious looking weapon was abondoned with numerous others as the Allies pushed on along a road in the Vada area.*



Damaged Steel Landing Mats Now Get "On the Spot" Reconditioning

Youngstown

• • • **Steel landing mat** surfaced war front airfields, when bomb damaged or mutilated by the landings of heavy bombers and fast landing fighters, are being treated to an "on the spot" face lifting and reconditioning with a new portable landing mat rehabilitation plant being built here by Aetna-Standard Engineering Co. for the U. S. Corps of Army Engineers.

The landing mat rehabilitation plant is a series of portable units which can straighten and clean bent steel plank landing mats right on location at a high rate of speed. Its relatively light weight and compactness permits it to be flown from one damaged airfield to another. It carries its own self-contained power unit for operation anywhere.

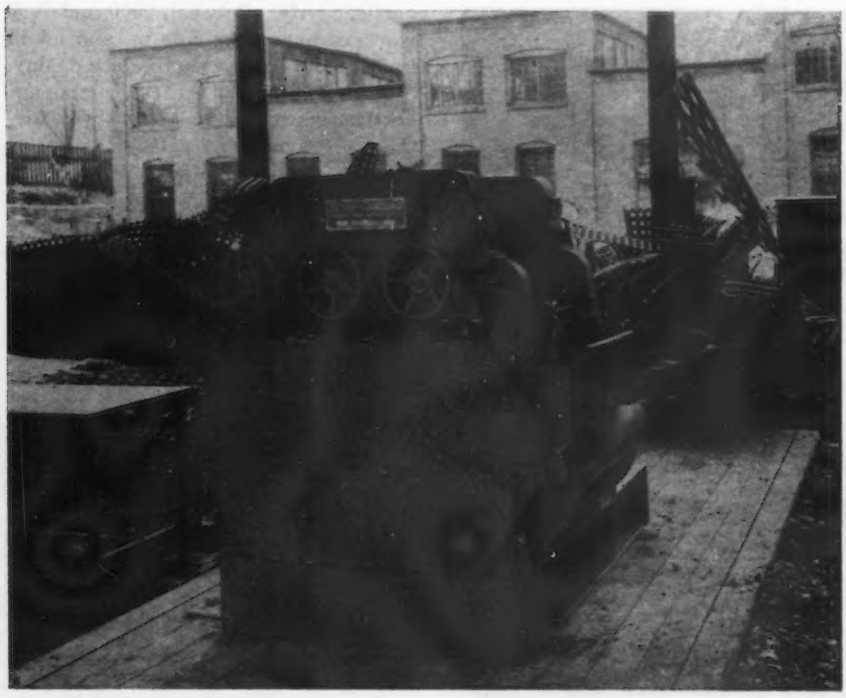
The plant consists of two main machines, a roller leveler for straightening and a brush cleaning machine. Accessory equipment includes feed and delivery tables, a hand straightener for extremely bent sections, anvils for the top and bottom of sections and hand tools for straightening the hooks along the sides of sections. The machinery is self powered.

Designed to recondition damaged pierced plank of landing mat sections, the entire operation consists of lifting the mat from the field, straightening badly bent sections enough to permit entry to the straightening rolls, hand straightening the side hooks which may have been badly twisted, and feeding into the roller straightener and brushing machine. Straightened and clean sections are produced at a maximum speed of 300 an hour although ultimate speed relies upon the hand operations.

However, speeds of 300 an hour have been attained on a pilot plant which has been operating at a nameless airfield in Florida for a number of months. At this speed a complete runway of approximately 300 ft. width and one-half mile length could be entirely reconditioned in about 200 hr.

The true advantage of the method is that the units can be flown up right behind the fighting fronts and airfields reconditioned as quickly as the front progresses. It is expected that several units would be flown in per field, thus cutting reconditioning time to a matter of a few days. Secondary, but not inconsequential, is the fact that thousands of tons of steel landing mat sheet may be saved through rehabilitation. The Army's main purpose in providing the rehabilitation service is thought to be expediency, but consumers faced with long delays in the delivery of sheet for other war purposes will appreciate any lowered demand for sheet produced through reconditioning.

LANDING MAT STRAIGHTNER: *This portable roller leveler will soon be flown to damaged military airfields as part of a landing mat rehabilitation plant. The complete plant will straighten and clean up to 300 pierced steel plank landing mats per hour.*



NAM Strikes Back at Critics

New York

• • • **Needled to a point** of exasperation by such charges as that made by the Congress of Industrial Organizations which allowed that American industry was making "exorbitant" profits out of the war, the National Association of Manufacturers last week struck back at its critics.

Robert M. Gaylord, president of NAM, declared that not only were American corporations earning lower profits on wartime sales than on peacetime sales, but also that they had done their wartime job "at a fair price." Gaylord based his statement on a detailed study of corporate profits by John C. Gebhart, NAM's research division director.

The association contended that while the dollar volume of corporate profits last year was considerably higher than in 1939, last year's net earnings were low when considered in relation to the tremendously increased volume of production, which was $298,000,000,000, compared with $131,000,000,000 in 1939.

The rate of profit declined from 3.1 in 1939 to 2.8 per cent in 1943, the study showed. But, it said, profits increased in the aggregate by 101 per cent, while production went up 127 per cent.

Mr. Gaylord, who is president of the Ingersoll Milling Machine Co., Rockford, Ill., said that profits were "staying in line, even in wartime, when they don't go up as fast as output."

The study showed that all corporations made profits after taxes last year of $8,200,000,000 on more than a quarter trillion dollars worth of business, compared with profits after taxes of $8,000,000,000 in 1929 on not much more than half of the 1943 volume.

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doesn't just stop trains—

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When you are thinking about improving products or production equipment, you'll find it profitable to consider W·A·B Controls. Give them a place in your planning.

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United States C of C Offers Program For Postwar Development

Washington

• • • **The Chamber of** Commerce of the United States made public recently through its general manager, Ralph Bradford, a program of action for American business looking to a quick ending of the war and early removal of obstacles to full postwar economic development.

The 11 objectives of the Chamber, as set worth in the program, are as follows:

1. Winning the War

Business will continue to devote its energy towards winning the war at the earliest moment.

2. Service Men and Women

Work for private and public policies which will enable service men and women to reenter civilian life with fullest opportunity for profitable employment in an expanding economy.

3. Taxes

Assist the government to obtain as much revenue as possible without hampering the national economy, impairing our system of free enterprise, or ham-stringing efficient war production. Develop and advocate the enactment of postwar taxation policies necessary to encourage risk-taking, to reduce the burden of government expenditures and thus stimulate business activity and employment.

4. Civilian Supply

Encourage policies favoring the release of materials and restrictions as rapidly as the war permits, and guided to the greatest practicable extent by the demands of consumers.

5. Wartime Controls

Encourage continued industry cooperation with government agencies in administering necessary wartime controls and in the meantime work for a rapid shift to reliance upon competition and an expanding production of civilian goods.

6. War Contracts Settlement

Work to secure prompt settlement of terminated contracts, so that industry may proceed to normal production and employment.

7. Reconversion

Encourage industry solutions of problems in cooperation with government agencies; provide assistance to industry through trade associations, related groups of associations, and chambers of commerce.

8. Surplus War Property

Urge the prompt enactment of legislation by Congress which will provide sound policies and effective machinery for the orderly and equitable disposal, through established channels, of surplus goods and plants when no longer needed for war or national defense.

9. The Field of Government

Emphasize the necessity of reducing the size and scope of wartime government as soon as practicable. Support the principle of keeping the control and operation of government as close as possible to those who are governed. Resist unnecessary encroachment of federal functions upon those proper to the states and localities.

10. Expansion of Domestic Economy

Encourage the opening up of new frontiers of opportunity for the investment of capital and the expansion of business activity, small and large, with special attention to agricultural and urban development, to transportation and communication, and to management-labor relations. Support social security measures which have been approved by business.

11. World Economics

Prepare for the resumption to the maximum extent practicable of the exchange of goods

and services between countries through normal trade channels working in cooperation with the government and with business men elsewhere, with special attention to the problems of foreign exchange. Work for the establishment and development of cooperative arrangements among nations looking to elimination of wars.

•

New York

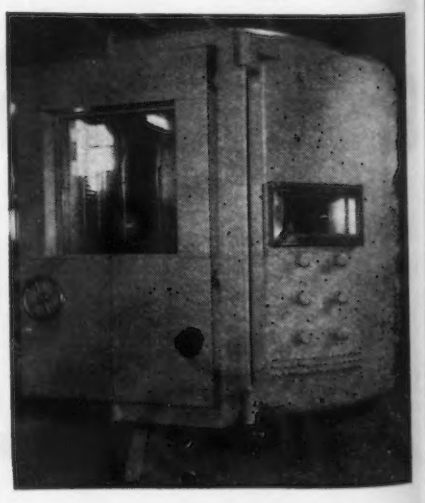
• • • **Looking to maximum** employment of American workmen, the National Association of Manufacturers has urged that plants and equipment not needed for war purposes be returned to private industry for production of civilian goods at the earliest possible date after men and materials are available.

This was part of a 12-point program for disposition of government-owned plants, equipment and supplies which has been formulated by the NAM Subcommittee on Disposal of War Surpluses. The program has the formal approval of the NAM board of directors, representing approximately 12,000 American manufacturing organizations.

Highlights of the 12 points are:

1. The primary problems are the military security of the United States and the provision of employment.
2. Maximum employment will not be created unless plants and equipment not needed for military purposes are used in private production at the earliest possible date.
3. Congress should establish a 7-man Surplus War Property Commission, independent of existing agencies. This commission should be given authority of all property acquired for war use, and not needed for national defense. The commission should be composed of members having at least five years industrial or merchandising executive experience. The commission should select its chairman, designate its secretary, and have power to employ technical assistants.
4. A joint board of the armed forces should

LIKE 15 MILES UP: *Inside this 18-ton stratosphere chamber a temperature of minus 67 deg. F can be achieved, equal to the weather prevailing 75,000 ft. in the air, and air pressure can be reduced to parallel levels as well. The chamber, recently delivered by Kold-Hold Mfg. Co., Lansing, Mich., to a war producer, will be used to test radio equipment, instruments and plane parts destined for high altitude use.*



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TYPICAL EXAMPLES OF WORK GROUND AND INSPECTED ON THIS MACHINE WITHOUT USE OF RADIUS DRESSER OR FORMED WHEEL

Cemented-Carbide Tipped Form Tool
Width of Carbide Tip.....1¾"
Stock Removed .....approx. .040"
Grinding time including set-up and complete inspection of contour before removal from machine ..... 3½ hrs.

Circular Form Tool with Preformed Cemented-Carbide Tips
Stock Removed .....015"
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The Wickman Profile Grinder is a machine which makes possible substantial savings in machining time. It produces extremely accurate work, tolerances even closer than ± .0005" being secured with reasonable care in operation.

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The layout and brain-work are done in the drafting room. The operator has nothing to measure. She sees it done. She knows at all times where every point on the contour is, during its development, in relation to every other point on the tool without removing it from the machine for partial inspection. Write for completely descriptive literature.

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stipulate which government-owned property and supplies, including merchant vessels, are needed for national defense.

5. All government agencies and departments possessing property acquired for war use should establish inventory records. As soon as property becomes surplus, the record thereof should be transferred to the Surplus War Property Commission.

6. Guides used in disposition of surpluses should be the rapid maximization of post-hostility employment, the effects on existing enterprise, and the interests of the taxpayers.

7. Surplus property might be disposed of by lease, with or without purchase or renewal options.

8. Quantities of equipment and supplies released for sale should be in lots which would permit participation by small as well as large manufacturers, wholesalers and retailers, with price differentials between small and large lots limited to actual differences in cost of handling.

9. In order to protect private enterprise from unfair competition, it would be provided that disposition of any class of property would be made only after receiving the advice of a committee representing the industry most directly affected.

10. Surpluses held outside the continental United States, its territories and possessions, competitive with products of the U. S. should be disposed of abroad so far as possible. Such goods sold should be prevented from subsequent entry into the U. S., territories and possessions.

11. Recognizing the devastation which will have taken place throughout the world, the commission would have the authority to dispose of surpluses in reconstruction and rehabilitation through other agencies created for such purposes.

12. The armed forces should be advised by Congress that it is the national policy that the arsenals and navy yards should continually be maintained in accordance with the best technique and developments, with the understanding that as far as feasible private manufacture would be utilized for all production.

Production Test Cells Now under Construction

East Hartford, Conn.

• • • **Eight new production** test cells, each capable of handling engines of up to 4000 horsepower, are under construction at the East Hartford plant of Pratt & Whitney Aircraft Division, United Aircraft Corporation, it was announced by General Manager William P. Gwinn recently.

When the eight additional test units are completed, it will bring to seventy the total of production test cells available at the plant. These are in addition to various experimental test units assigned to research and development of new models.

WPB Removes Restrictions On Bituminous Distributer Sizes

Washington

• • • **Restrictions** on the sizes in which bituminous distributers may be manufactured and minimum-capacity specifications for bituminous distributer pumps were removed on Monday by WPB through revocation of Schedule XI of the construction machinery and equipment simplification and conservation order, L-217. Bituminous distributers are used for hauling and spraying asphalt in road construction.

LABORATORY BEACHHEAD

All the fury of a storm at sea rages within these cabinet walls when the lid is lowered and the salt spray turned on. This is the quick way to determine how metals protected with various corrosion preventives can resist rust in the continuous fog of a concentrated salt solution.

Corrosion preventives must not only pass the salt spray test, but are frequently subjected to cycle treatments, combining salt spray with humidity exposure, rain, water immersion and ultra violet rays in a predetermined cycle. If the protective coating takes that beating without failure, it can be depended on to protect our vital war materials on any ship, beachhead or jungle.

Houghton, makers of rust preventives for three generations, has complete facilities for pre-testing. We know in advance what these products will do, and our control "lab" guards them during manufacture to be sure they exceed the minimum required. Today we meet practically every government "spec" for corrosion preventives. May we quote on your requirements? E. F. HOUGHTON & CO., 303 W. Lehigh Ave., Philadelphia 33, Pa.

Houghton's RUST Preventives

Pullman-Standard Is Multiplying Its Shell Production

Butler, Penna.

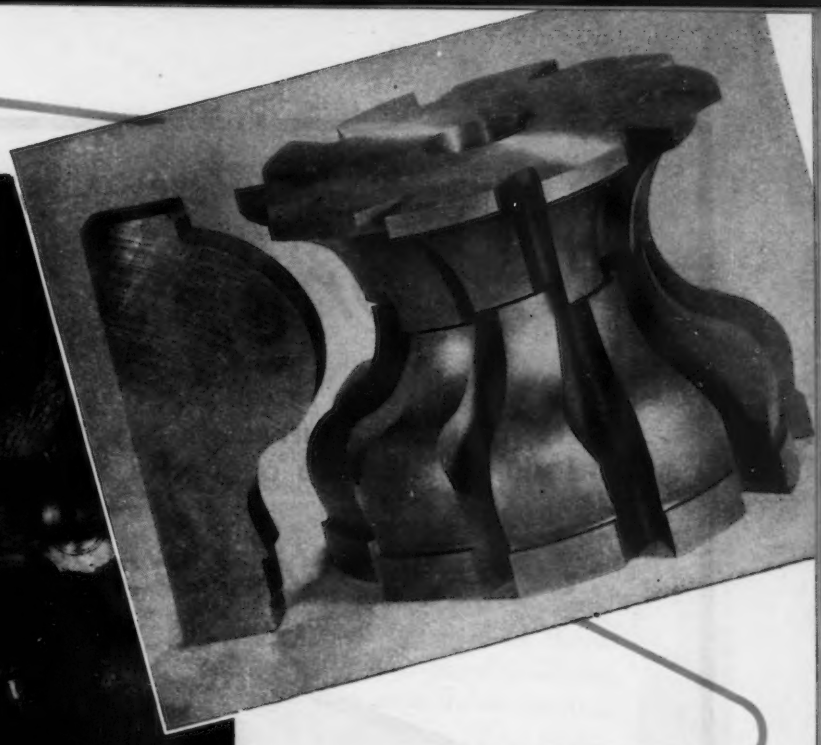
• • • The local plant of the Pullman-Standard Car Manufacturing Co. is multiplying its production of heavy artillery shells.

Output rate of one large size will be tripled within the next two months, it was stated by Wallace N. Barker, vice-president. The second will be stepped up to 125 per cent and a third to 114 per cent of current rate.

Barker disclosed that the company is installing a second 8-in. shell forging line at Butler, costing more than $500,000. When operations begin on it in the fall, the plant's capacity for this size shell will be doubled. The Butler plant's first line on this size began turning out shells a month after Pearl Harbor, initial production of this sort in the country and has been forging at capacity for more than two years.

Meanwhile, it was said that the Pullman-Standard's Hammond, Ind., plant is converting its shell making facilities to the manufacture of Navy shells.

PIN-UP GUN: *Workers examine a new 8-in. gun recently assembled in the S. Morgan Smith plant at York, Pa. The York Corp. cooperated with the Smith plant in accomplishing the gun's production. The piece has been dubbed "the pin-up gun" of the invasion.*



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Mining Companies Reply To Union Demands Before Labor Board

Duluth

• • • **Contending the statement** made by Philip Murray before the steel panel that steel workers, and all those involved in the present wage controversy, live "in areas where prices have gone up beyond those in rural communities" have no application in the iron ore case, Earl E. Hunner, representative of M. A. Hanna Co., made the first presentation of the mining companies before the iron ore panel of the War Labor Board at its hearing in answer to the demands of the USWA-CIO.

His statement of general facts relating to the iron ore mines of Lake Superior ranges followed the presentation of the union's statement by Martin Raphael, assistant counsel for the USWA. The CIO briefs were the same as those submitted to the basic steel panel in Washington.

Representatives of 40 iron ore mining companies will attempt to show that increased production costs, as represented by the union's demands, will retard developments of the iron mining industries in the Lake Superior iron ranges.

The first statement made before the iron ore panel also refuted the ideas that there are nothing but "captive" mines producing iron ore for steel companies by saying that such theories are "based on a misunderstanding of facts." He quoted OPA figures showing that in 1942 the total merchant, or "non-captive," ore tonnage shipped was approximately 22,552,580 tons. This represents from 24 to 26 per cent of all iron ore shipments, which is one and one-half times greater than all iron ore shipments from all other sources in the United States.

Emphasizing the great contrast between ore mining and steel workers, Mr. Hunner said: "Mining of ore and manufacturing of steel involve entirely different operations and processes carried on by entirely different classifications of labor.

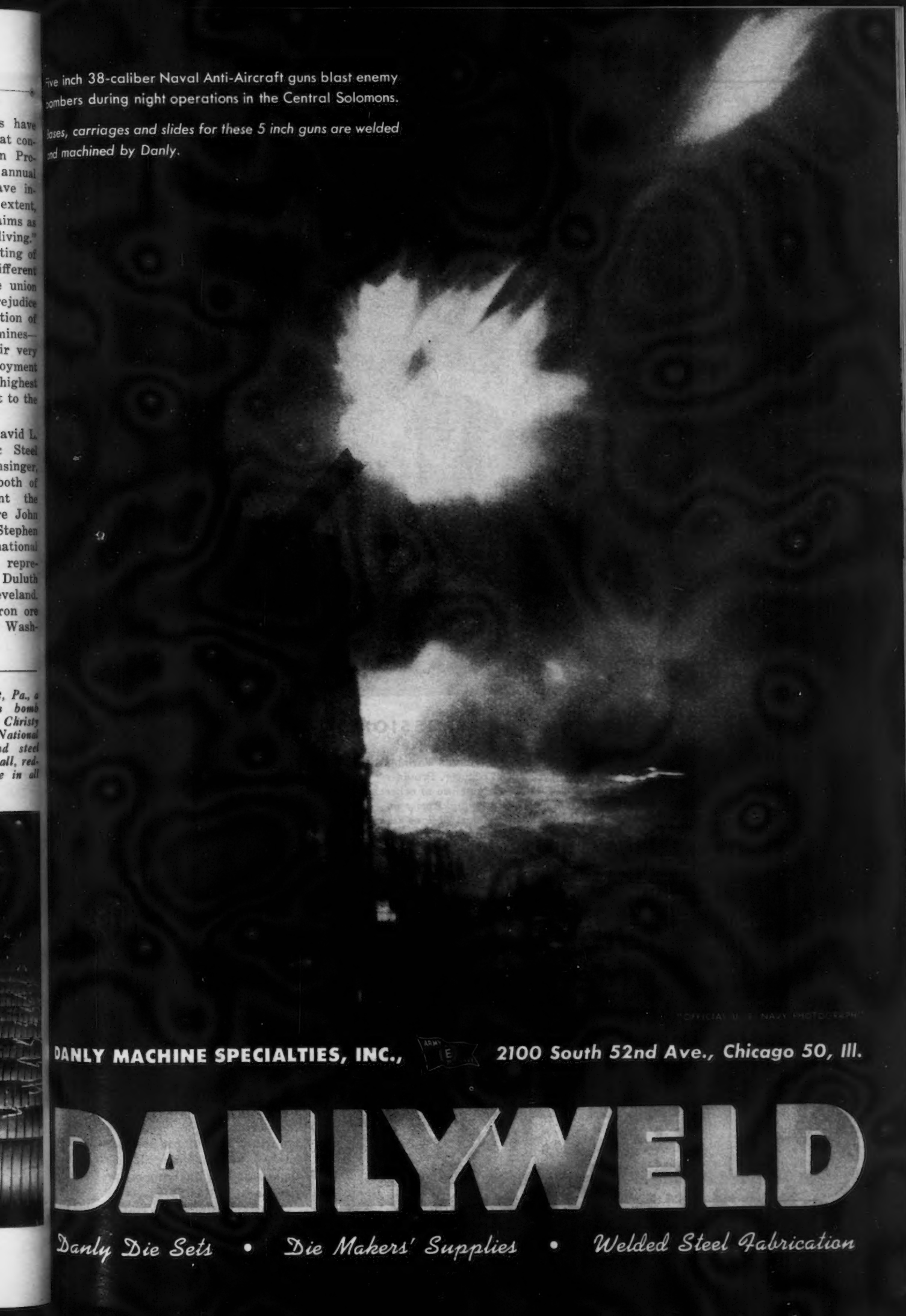
"Many of the provisions concerning wages and working conditions," he said, "are entirely different as between mining companies and steel plant operations," and his presentation proceeded to define those differences.

In concluding his statement, he said that presentations were to be made showing that wage rates and earnings

of mining company employees have "increased to a point beyond that contemplated by the Stabilization Program of our government, that annual earnings of these workers have increased to a much greater extent, greater than even the union claims as the increase in the cost of living." Also, he emphasized, the granting of the demands would have far different effect than anticipated by the union and that it would operate to prejudice seriously the competitive position of Lake Superior underground mines—those which relatively, by their very nature, furnish the most employment and therefore have by far the highest labor cost and would be subject to the greatest burden.

Members of the panel are David L. Cole, chairman of the Basic Steel Panel, and Nathan P. Feinsinger, vice-chairman of the group, both of Washington. They represent the public. Representing labor are John Destol, San Francisco, and Stephen Levitzky, Pittsburgh, international representatives. Industry is represented by Thomas M. McCabe, Duluth attorney, and R. C. Allen, Cleveland. Union rebuttals of both the iron ore and steel cases were heard in Washington on July 6.

AXIS POISON: *At McKeesport, Pa., a worker lifts a fragmentation bomb from the assembly line at the Christy Park Works of U. S. Steel's National Tube Co. The tightly wound steel spring bursts into countless small, red-hot, sharp pieces which strike in all directions.*



Five inch 38-caliber Naval Anti-Aircraft guns blast enemy bombers during night operations in the Central Solomons.

Bases, carriages and slides for these 5 inch guns are welded and machined by Danly.

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DANLYWELD

Danly Die Sets • Die Makers' Supplies • Welded Steel Fabrication

Quality Control By Statistical Methods Conference Subject

Kent, Ohio

• • • **That quality control** by statistical methods can be applied to a wide variety of production control problems; that it can be applied to both high and low production items; that it pays dividends to both the small and large manufacturer and that it is far superior to so-called 100 per cent inspection was the consensus in the first day of an eight-day conference on quality control here recently.

The conference was conducted for engineers, production executives and other industries personnel by Case School of Applied Science, at Kent State University, July 12 to 20, in cooperation with the Office of Production Research and Development of WPB and the U. S. Office of Education.

Prof. G. B. Carson of Case School discussed the fundamentals of statistical quality control, laying a simple and understandable groundwork on which to build the practical discussions that followed.

"Increasing War Production Through Statistical Quality Control" was discussed by Dr. Holbrook Working, chief, Quality Control Program, Office of Production Research and Development, WPB, Washington, who emphasized the many practical accomplishments of quality control systems. Some of these were: Reduced waste or scrap; reduced downtime on machine operation; increased output; reduced inspection costs; increased quality assurance; improved quality of purchased material and rationalization of specifications. The control chart gives more information from any given amount of inspection data than would be attainable by that amount of inspection without use of charts. By the better use of inspection data through charts, inspection itself can be reduced and at the same time quality increased. Charted data enables the manufacturer to show his supplier the causes for rejecting his material and help him build quality into his product. With average inspection methods on incoming material, rejections would be noted but no facts gathered to bring about their elimination. But for best results, the control system must have realistic understanding and support of the entire organization.

Substantiating the statements of Dr. Working were the effective demon-

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More than ever before, motor hp. is the number one factor — the starting point when purchasing milling equipment. Range is important, of course, particularly with milling machines for light cuts, but motor hp. of ample rating is the first consideration wherever heavy cuts are involved.

Since motor hp. is of such basic importance the substitution of a higher hp. motor above that of the motor normally specified for a No. 2 Milling Machine — to gain power and speed — is unsound practice because the power is excessive and out of balance with the design and construction of a No. 2 Machine.

Milwaukee Milling Machines are power-engineered — *PoweRated* — designed and built in keeping with their hp. range plus the normal overloads encountered within their field of job application. You can always be sure of the correct motor power in every Milwaukee.

The next time you need milling equipment, think in terms of motor hp. for heavy cuts — range for light cuts — and check with a Kearney & Trecker field engineer in deciding which *PoweRated* Milwaukee is best suited to your specific needs.

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- **MILWAUKEE PoweRated MILLING MACHINES**
- **Standard Models—Horizontal, Vertical and Bed Types — available in Motor ranges from 3 to 25 HP.**
- **C.S.M. (Carbide Steel Milling) machines 20 to 50 HP.**
- **Special Machines — Consult K&T engineers.**

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strations of practical and highly productive application of statistical methods in their respective plants by Seibert Hill, section inspector of Westinghouse Electric & Mfg. Co., Mansfield, Ohio, and Leroy W. Rankin, supervisor of quality control, Wilcox-Rich Div., Eaton Mfg. Co., Saginaw, Mich.

Mr. Hill showed how installation and proper analysis of the control chart system brought to light the sources of troubles that were causing tremendous material loss, with correspondingly high monetary loss, and aided in their elimination to the extent that a saving of over $26,000 was effected in the first five months—with only about 3 per cent inspection required to develop the charts.

Mr. Rankin's demonstration was on a high production item on which rejections of 28 per cent occurred on 1½ million pieces. Statistical control methods showed that there were two assignable causes for rejection. Applying study to these two problems resulted in their correction to the extent that rejections dropped from 28 per cent to 2.8 per cent. Since it has been proved that 100 per cent inspection eliminates only 75 per cent of the errors, 25 per cent getting by, the fact was that they were turning out 35 per cent defective parts. Now on the 2.8

ON THE DOUBLE: *H. D. Benge, a boilermaker, sets a new record in welding jack blocks as he operates two electrodes at the same time in the yard of the Oregon Shipbuilding Corp. at Portland, Ore. Benge, a former shipfitter, only turned to welding recently.*

Safety breeds contentment . . . Safety to workers means confidence against dangerous slipping accidents . . . added satisfaction and increased output. "A. W." Rolled Steel Floor Plate provides easy, comfortable traction underfoot. Eliminates maintenance expense on floors that must withstand punishing hours of wear. Illustrated is the "A.W." Super-Diamond Pattern which resists slipping in *any* direction. Pattern is uniform and can be readily matched. Write for folder.

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MAIN OFFICE AND MILLS: CONSHOHOCKEN, PENNSYLVANIA : SINCE 1826. District Offices and Representatives: Philadelphia, New York, Boston, Atlanta, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Houston, St. Paul, New Orleans, Pittsburgh, Roanoke, Sanford, N.C., St. Louis, Los Angeles, San Francisco, Seattle, Montreal.

per cent basis, assuming that same percentage gets by inspection, there are but 3.5 per cent defective parts being made. Downtime on machines was appreciably reduced, and production increased. Normal production per operator using three machines was 4068 pieces, while the same operator using two machines, under control, produced 4298 pieces. Many other instances of savings were shown. Inspectors in the automatic department were reduced from 15 to 4, by means of control chart applications, while the saving in "salvaged" tools that under previous "inspection" methods had been rejected as defective ($3200 in Rockwell diamonds) was decidedly worth while. Many times the charts suggested simple remedies for what appeared to be serious problems in production control.

Dr. John W. W. Sullivan, chief of inspection, Cleveland Ordnance District, War Department, under the subject "Scope of Statistical Methods in Quality Control" gave a glimpse of the fields of application of particular types of analytical methods. To the objections that too many variables have to be considered to permit installation of control methods, or too many measurements have to be made, too much data collected . . . analysis of case histories show that actually fewer measurements are required and that proper control system eliminates much inspection. Charts as contrasted with ordinary inspection system might be likened to a moving picture as contrasted with camera still shots. They are handy tools, not complicated gadgets, and a careful analysis in connection with variables usually leads to constructive information that reveals specific variables that are out of control.

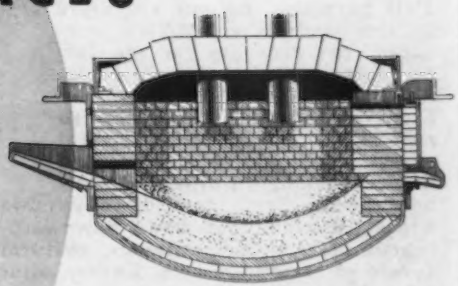
An instance was cited of a large new plant of a leading steel company where out of a production capacity of 4000 tons of steel daily, 100 tons will be consumed in physical, chemical and metallurgical tests and scrapped from these tests. Statistical analysis experts should be able to materially reduce this 2½ per cent "sample" loss now considered necessary to insure product uniformity.

Dr. Edwin G. Olds, chief statistical consultant, Office of Production Research, WPB, cited numerous specific cases where properly applied and analyzed statistical control methods had proved of inestimable value . . . a powerful engineering tool based on sound scientific principles used as facts instead of guesses and opinions.

MOORE RAPID *Lectromelt* FURNACES

"MT" Lectromelts of the top charge type are daily pouring 25 ton heats of quality steels and irons. The rapidity and dependability that characterize their operation are helping produce greater tonnages of vital war steels.

Top charge Lectromelts are available in sizes from 100 tons to 250 pounds. We will gladly forward additional information upon request.



★ *Lectromelt's patented spheroidal furnace bottom keeps scrap moving down as melting progresses and permits heavy loads and more rapid melting. Lectromelt furnace bottoms are correlated to the angle of furnace tilt so as to insure complete drainage.*

PITTSBURGH LECTROMELT FURNACE CORPORATION
PITTSBURGH, PENNA.

A fundamental principle is that quality cannot be inspected into a product—it has to be built in and quality control by statistical methods helps right building.

Among reference publications mentioned were "Economical Control of Quality of Manufactured Product" by W. A. Shewhart and "An Engineers Manual of Statistical Methods" by Lt. Col. L. G. Simon. The American War Standards Association has also prepared numerous publications on the subject.

Among the Week's Trade Notes

Pacific Railway Equipment Co., Los Angeles, is now known as Preco, Inc., according to a company announcement. There is no change in management, personnel, or policy.

•

Kinney Aluminum Co. announces that construction on its new plant in Huntington Park, Cal., is nearing completion.

•

Box-Rust Corp., Chicago, manufacturers of specification rust preventives, has opened a Detroit office at 433 New Center Building. E. J. Johnson is in charge and N. J. Mollhagen is technical engineer.

•

American Machine & Metals, Inc., has moved its New York headquarters to the Woolworth Building, 233 Broadway.

•

Continental Can Co., Inc., has acquired for cash all the capital stock of the Cameron Can Machinery Co., Chicago. The Cameron company will operate as a subsidiary with the same officers as heretofore.

•

Wickwire Spencer Steel Co., New York, announces the purchase of the business and assets of the Sirian Wire & Contact Co., Newark, N. J. Wickwire will assume full control of all management and production operations. The new subsidiary will be known as the Wickwire Spencer Metallurgical Corp.

•

Titan Metal Mfg. Co., Bellefonte, Pa., announces the removal of a building from New Castle, Del., to central Pennsylvania to serve as an addition to the Titan plants.

•

Willamette Hyster Co., Portland, Ore., announces that it has changed its name to Hyster Co.

•

Wyckoff Drawn Steel Co., Pittsburgh, has changed its name to Wyckoff Steel Co. There is no change in organization, service or personnel.

•

Ampco Metal, Inc., Milwaukee, has built and completely equipped a new plant at 30 East Burbank Boulevard, Burbank, Cal., in order to improve delivery and technical advisory service to West Coast customers.

•

Bliss & Laughlin, Inc., Harvey, Ill., has purchased from the New England Drawn Steel Co. its entire plant and business located at Mansfield, Mass.

•

Huck Mfg. Co., Detroit, has appointed M. E. Adams as West Coast representative, according to Louis C. Huck, president.

•

Bristol Co., Waterbury, Conn., has appointed A. G. Budd as mill supply products salesman for the Cleveland and Pittsburgh areas. Mr. Budd will make his headquarters at the Engineer's Building, Cleveland 14.

Capacity Orders For Shells Awarded To Willys-Overland Co.

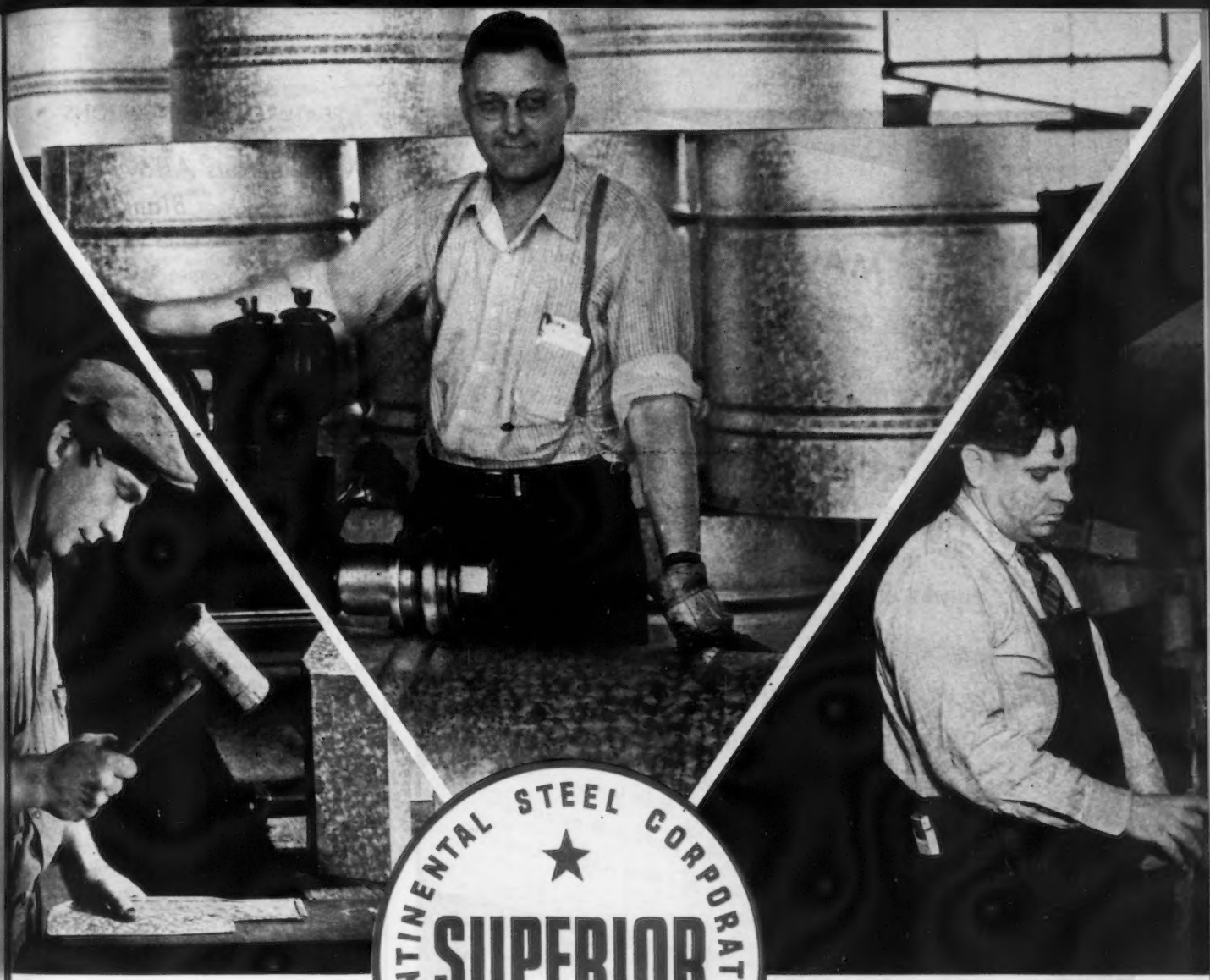
Toledo

• • • **Capacity orders** for the production of 155 mm. medium artillery projectiles to meet the unprecedented demand of U. S. fighting forces in Europe have been awarded to Willys-Overland Motors, Inc., it was announced here recently by Ward M. Canaday, chairman of the board.

The firm has been producing the 6-in. shells since the fall of 1941 and has turned out more than 2,000,000 155 mm. high explosive and smoke projectiles, it was revealed.

The Willys executive said that facilities for these projectiles have been expanded in past weeks and production is being stepped up to meet the Army's increased demands. One of the largest manufacturers of the 155 mm.'s, the Toledo auto concern cooperated with the Army in developing forging methods and other mass production techniques which have been adopted by other producers of the shell, Canaday said.

RADIO "BOMB": *At Pittsfield, Mass., a worker embraces what appears to be a huge projectile outside the General Motors plant. In reality, the "thing" is three different size plastic domes built by GE for the protection of war-time radio equipment.*



CONTINENTAL STEEL CORPORATION

SUPERIOR STEEL SHEETS

WORKABILITY THAT GETS THINGS DONE

The importance of workability in galvanized sheets has long been recognized by Continental and Superior metallurgists. They have worked to perfect a sheet for the man on the job. The result is new SUPERIOR GALVANIZED. This sheet forms quickly and easily. Its ability to withstand forming operations without flaking or peeling goes far beyond that of ordinary sheets. It solders well, handles well and possesses a high degree of uniformity.

The special properties of Continental's new galvanized sheet may be of value in your products, present or future. You are invited to write for additional information.

CONTINENTAL STEEL CORP., KOKOMO, INDIANA
THE SUPERIOR SHEET STEEL CO., CANTON, OHIO

★ ★ ★ ★ ★

SUPERIOR

CONTINENTAL STEEL CORPORATION

Non-Ferrous Alloy Blanking Dies

(CONTINUED FROM PAGE 49)

cent, begins to cause "hot shortness" of the metal. Antimony is also a noxious impurity.

The other common impurity, iron, which may be picked up by overheating the alloy in iron pots, causes when in excess of 0.1 per cent, decreased castability, greater hardness, brittleness and the formation of surface marks on castings.

A short consideration of the constitution of this range of alloys is of value in assessing their general properties and suitability as die materials for drop hammers and mechanical presses. The main alloying additions to the high purity zinc base are aluminum and copper and the function of each of these will be briefly considered in turn. Magnesium is also added owing to its powerful influence in suppressing any intercrystalline corrosion which might develop from traces of lead, tin and cadmium in the alloy.

Aluminum is an essential constituent since in combination with zinc it forms a fine grained eutectic at 5 per cent aluminum which melts at 716 deg. F. It is upon this eutectic that the strength and castability of the alloys depend. Aluminum also has the property of preventing, almost entirely, the solution attack of iron by zinc. The explanation of this lies in the fact that iron-aluminum compounds are formed preferentially to iron-zinc compounds. This property is, of course, essential for alloys which are to be melted extensively in iron pots.

In the presence of copper the aluminum-zinc eutectic becomes a ternary eutectic melting at 698 deg. F. The eutectic point occurs at 7 per cent aluminum and 4 per cent copper. Additions of copper to a 4 per cent aluminum alloy causes (1) an increase in castability, and (2) greater strength and hardness as shown in Fig. 4. The copper content of K. M. alloy has been fixed so that good strength and hardness are obtained (Fig. 4), while at the same time optimum castability and freedom from segregation during melting are retained.

The microstructure of K. M. alloy in the as-cast state is shown in Fig. 5. The white grains of the primary zinc rich phase can be seen surrounded by the ternary zinc, aluminum, copper eutectic.

For the blanking purposes described

in this article, K. M. alloy is supplied in rolled plate, ⅜-in. thick in sizes up to 6x3 ft. The structure of the alloy is thoroughly broken down in rolling, as will be seen from the photomicrograph in Fig. 6. The rolling procedure, which involves a considerable degree of cross-rolling, improves the mechanical properties of the material, consequently it is to be expected that blanking dies made from rolled sheet will give better service than the cast type. No directionality of properties in the rolled sheet has been observed from Brinell impressions which have been found to be equidiametrical. Tensile test specimens, cut both with and across the grain, shows the average of three determinations across the grain to be only 0.6 per cent higher than the average of the corresponding number with the grain. This difference can hardly be considered significant.

Not least among the properties of K. M. alloy which makes it particularly suitable for the forming and blanking of light alloy sheets is its self-lubricating nature, which ensures that aluminum sheet is never scratched or damaged during forming or blanking. In this latter operation using a steel punch, at each stroke of the press the zinc alloy appears to be drawn towards the punch, so that the die is, to a certain degree, self-sharpening. The alloy is sufficiently soft to be readily cut by a band saw, and yet hard enough and having sufficient work hardening properties, to maintain its shearing edge during blanking. It is also soft enough to enable modifications to be made to dies rapidly and without difficulty.

Typical mechanical properties of K. M. alloy are given in Table II.

TABLE II
Mechanical Properties of K. M. Alloy

	Rolled	Chill Cast
Ultimate compressive strength, lb. per sq. in., load per initial area	*	115,800
Elongation, per cent on 2 in.	22.5	*
Brinell hardness	100	109

* Not determined.

The alloy has a specific gravity of 6.7 (0.24 lb. per cu. in.), and a melting point of 716 deg. F.

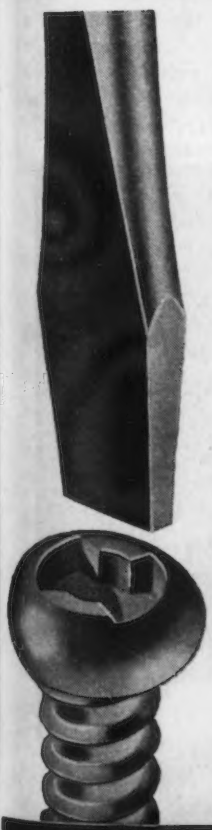
Research on K. M. alloy is continuing, so that the requirements of the aircraft industry may be most closely met. Attention is being paid to the possibility of producing a harder sheet so that longer runs on the blanking of steel may be obtained.

Editor's Note: Next week, the discussion continues with a description of the full scale layout method of accurate reproduction of aircraft parts and standardized die design.

New Bit Life in 60 Seconds

AGAIN, and AGAIN, and AGAIN this one-minute operation will restore the CLUTCH HEAD Type "A" Bit to its original efficiency. Contrast the elimination of cost and delay attained by this simple application of the end surface to a grinding wheel . . . as against the expense and bother of "back-to-the-factory" shipment of bits for reconditioning. Consider also, the rugged structure of this Type "A" Bit . . . a factor that enables it to deliver *a longer uninterrupted spell of service* on the Line between reconditioning grindings. The definitely longer total life of CLUTCH HEAD Type "A" Drivers is an economy item that has a direct bearing on final production costs.

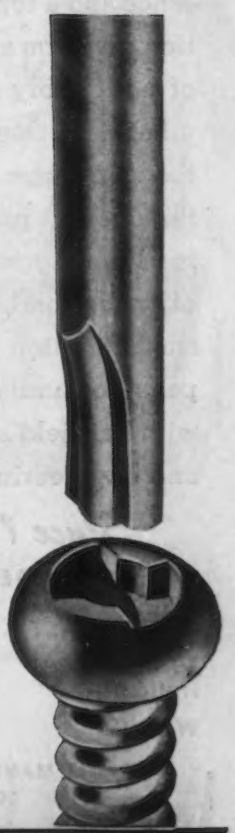
CLUTCH HEAD offers seven major features that contribute to faster, safer, and lower-cost production and service. You may examine and test these features right at your own desk. Ask us *to mail* you sample of this Type "A" Bit along with package assortment of CLUTCH HEAD Screws and illustrated Brochure. You will discover why CLUTCH HEAD is The Screw That Sells Itself.



This is the *only* modern screw that may be operated with the ordinary type screwdriver; even with a piece of flattened steel rod in emergency . . . so important in simplifying field problems in war and peacetime service.

CLUTCH HEAD · SCREWS ·

Note the straight-walled Clutch matched by the straight sides of the Driver. No tapered entry to create ride-out tendency. No end pressure required. This means elimination of fatigue factor for sustained high production.



UNITED SCREW AND BOLT CORPORATION

CHICAGO CLEVELAND NEW YORK

What Quenching Oil

(CONTINUED FROM PAGE 51)

described in the Petroleum Testing Codes published by the American Society for Testing Materials. When straight mineral oils are new, the neutralization number is generally 0.10 or less. When breaking down and starting to become more viscous and form "sludge," the neutralization number is generally about 1. The latter figure is a rough estimate, but with a neutralization number of 1, 2 or 3 it will generally be found that sludge is forming and the oil becoming thicker and thicker.

This breakdown of oils is perhaps a good example of why mineral oils are superior to all other types for quenching purposes. Mineral oils are much more resistant to decomposition than animal, fish, or plant oils, by all standards of comparison.

The effect of decomposition alters the general characteristics of all oils. For example, they thicken noticeably and their surface tension drops. Straight mineral oils have a surface tension of about 40 dynes per sq. cm. when new, and they drop to 15 dynes per sq. cm. or less when starting to throw down deposits as a result of oxidation or decomposition. These factors probably influence the quenching operation to some extent. Hence a charge of quenching oil cannot be used until it has become thick and hardly recognizable from the original, if uniform quenching results are to be obtained.

The opinions expressed in this discussion may seem very much biased in favor of straight mineral oils for quenching purposes. However, there is no disputing the fact that mineral oils are much more resistant to decomposition and change. Surely this is an important consideration when dealing with a subject that contains so many other variables, many of them classified as phenomena.

However, there may be some advantage in adding small amounts of various compounds to mineral oils. For example, some metallurgists believe that the addition of about 3 to 5 per cent of lard oil imparts beneficial results. The direct physical effect is to lower the surface tension of the mineral oil. However, such aids appear to be less important than maintaining the oil at a reasonably uniform temperature and providing means for its circulation.

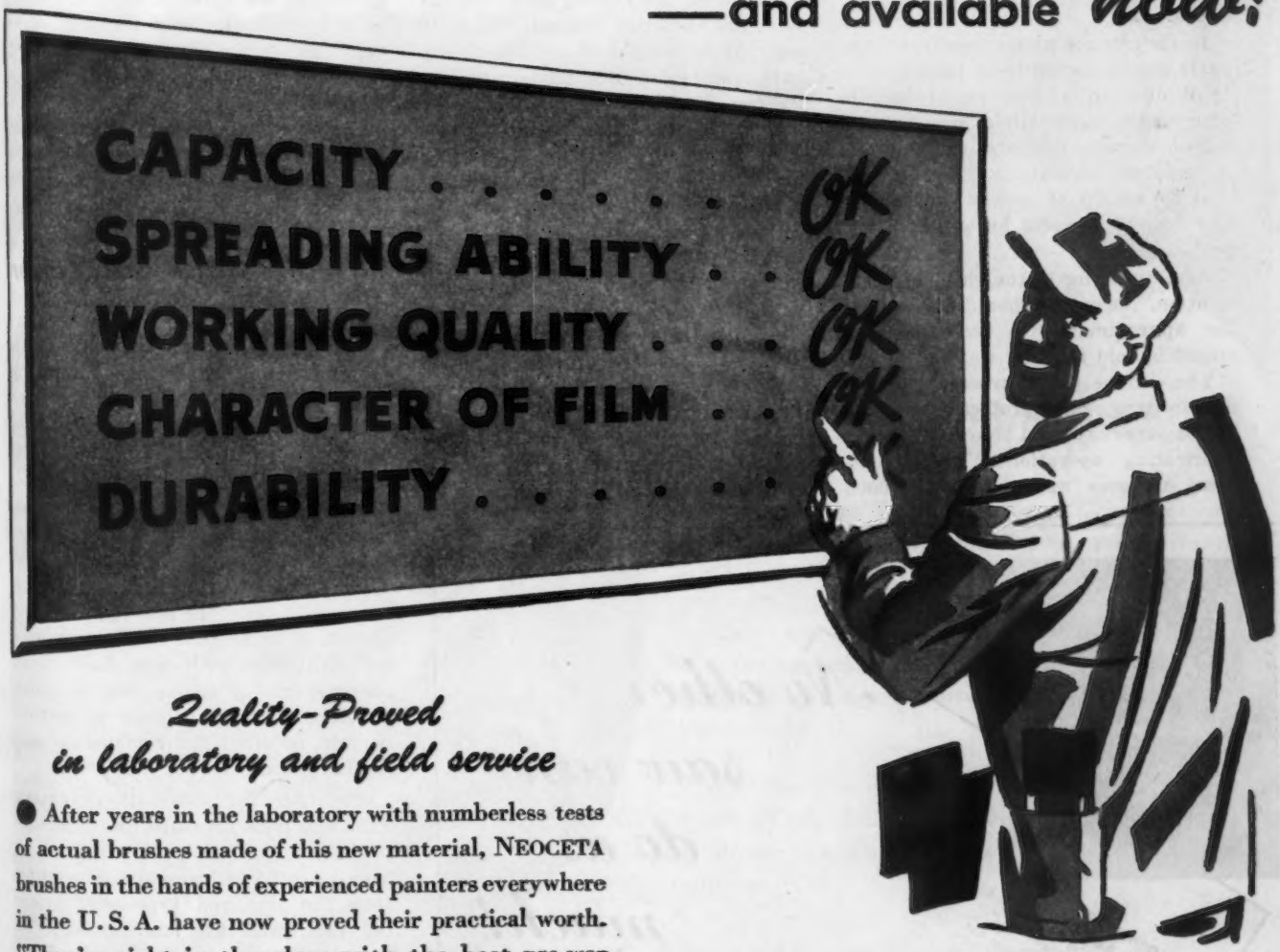
In conclusion I might say that the metallurgist could profitably add the following useful tests and instruments to the many in his laboratory: A viscosimeter, the neutralization test, and a surface tension recorder for liquids. This list of apparatus is by no means complete for oil testing purposes, but the list forms a nucleus for anyone interested in further study or private research along the lines which have been so briefly discussed here.

SINKING TANKER: *Crew members of a Jap oil tanker scramble over the side after a U. S. torpedo bomber scored a direct hit, 15 mi. north of Saipan. White spots (upper left) are members of ship's crew already in the water. Oil drums (right) spew from the tilting deck.*

NEOCETA

The *first, complete,* and *proved* line of synthetic bristle brushes

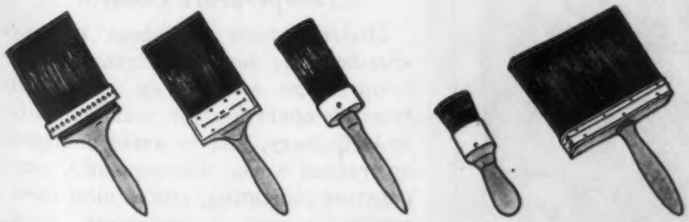
—and available *now!*



Quality-Proved in laboratory and field service

● After years in the laboratory with numberless tests of actual brushes made of this new material, NEOCETA brushes in the hands of experienced painters everywhere in the U. S. A. have now proved their practical worth. "They're right in the class with the best pre-war brushes," painters say. Skilled painters with great war-time production schedules have found in Neoceta brushes an answer to their needs far beyond their expectation. This is the first full line of painters' tools made of synthetic bristle—an important milestone in the development of brushes.

NEOCETA brushes of various types are now available. See the nearest "Pittsburgh" branch for complete information regarding NEOCETA.



PITTSBURGH PLATE GLASS COMPANY

NEOCETA brushes are manufactured by the creators of famous *Gold Stripe* brushes

Stainless Steel And Magnesium Pickling

(CONCLUDED FROM PAGE 59)

moved by use of these precleaning methods, it is permissible to subject the parts to a nitric-sulphuric acid pickle as an additional cleaning operation. Whenever this process is used, it must be applied prior to all machining operations since the amount of metal removed exceeds machine tolerance.

In the chrome pickle treatment, the parts are immersed for a period of ½ to 2 min. in a solution of sodium dichromate and nitric acid, maintained at room temperature. A typical solution formula is 12 to 15 per cent by weight of sodium dichromate and 9 to 15 per cent by weight nitric acid.

After pickling in the chrome pickle solution, the parts should be drained for approximately 5 sec. and then rinsed in cold running water.

The chrome pickle process provides only a temporary protective coating and is generally used before or during fabricating operations. This treatment removes approximately 0.0006 in. from the surface of the parts.

The Dow No. 7 treatment consists of two pickle solutions each followed by a rinse. The parts are first immersed in a solution of 10 to 20 per cent by weight of hydrofluoric acid maintained at room temperature. The immersion time is approximately 5 min. After the parts are removed from this solution they are given a clear water rinse at room temperature.

Following this rinsing operation, the parts are then put in a solution of 10 per cent by weight of sodium dichromate maintained at a temperature of 212 deg. F. for a period of approximately 45 min. After removal from this solution, the parts are then given a clear water rinse that may be maintained at room temperature or at a 180 deg. to 200 deg. F. A more satisfactory rinsing may be obtained by using both the room temperature and the hot water rinse.

If both these processes are to be used, they may be set up in a line as one unit with a single monorail or crane-way servicing all the tanks. If such an installation is made, a single, spray type, full draining, rinse tank can be installed to take care of all the specified cold water rinses.

In the past year, the chrome pickle process has been discontinued by most of the aircraft companies due to magnesium parts and materials being received temporarily protected. Where such is the case, it is required to install only a Dow No. 7 process unit. Installation of this unit may be made with only four tanks, the size of which depends upon production requirements. These four tanks should consist, in the order of their sequence, of a hydrofluoric acid tank, a spray type cold water rinse tank, a dichromatic tank, and a hot water rinse tank. The spray cold water rinse tank may be used for rinsing after either one of the pickling operations and the hot water rinse tank should be used for the final rinsing operation.

Guide to Furnace Selection

(CONCLUDED FROM PAGE 64)

ers, and gas and oil burner tunnels must be designed to meet the burning characteristics of the specific gas or oil. With heavy oils, it is sometimes necessary to preheat to assure the proper viscosity at the burner.

Fuel pressures: Standard operating pressures are ordinarily approximately 3 to 8 oz. for gases, and 15 to 25 lb. for oil. Where higher pressures are used regulators are required, although if sufficiently high pressures are available with gas fuels, high pressure gas injectors may be used. These use the gas velocity to entrain the air required for combustion and eliminate the need for a blower.

Air: Air for combustion (except when the high pressure gas injectors mentioned are used) is required at from 12 to 24 oz. pressure, depending upon the size and type of furnace and fuel; with the heavier oils, the higher pressures are preferable. This is most economically and satisfactorily supplied by turbo type blowers; however, for small and occasionally operated installations, where air at the required pressure is not available, high pressure air—40 to 150 lb. pressure—can be used by means of reducing inspirators.

Temperature Control

Modern steels and heat treating specifications demand extremely close temperature controls in each heat treating operation for maximum life and efficiency, and to avoid damaged or cracked work. Consequently, temperature indicating, and in most cases automatic control equipment, is a necessity.

MACHINE TOOLS

. . . News and Market Activities

Price Policy on Surplus Tools Praised

Cleveland

• • • **The machine tool** industry has now had time to realize that W. L. Clayton, administrator of Surplus War Property, deserves a hearty pat on the back for his price policy on surplus government owned machine tools announced on July 13. The industry is also beginning to understand that a policy has been set which will move these surplus tools readily and at the right price. It also applauds the fact that this was accomplished without lengthy legislative battles. Clayton acted under "Executive Order."

Under the new policy it is now possible for the user to get DPC-owned standard, general purpose tools to use at a substantially reduced price. Instead of the straight 8 per cent depreciation per year allowed by the original DPC lease agreements, the purchaser can operate under a decidedly faster sliding scale starting with an immediate depreciation of 10 or 15 per cent depending on the tool's location, less 2½ per cent per month for six months and 0.8 per cent per month thereafter.

Machine tools located in the purchaser's plant are initially reduced only 10 per cent since the cost of freight, moving and storage are eliminated in such a transaction. A 15 per cent initial depreciation is granted if the tool comes from another's plant. These are figured against the tool builders' original price.

As an example, a tool in the plant of the purchaser 24 months old would sell at 59.8 per cent of original value. This represents a reduction of 40.2 per cent as compared with a reduction of only about 16 per cent under the original lease-purchase agreement.

It is thought that since all DPC-leased tools need no longer be bought that a great many tools will be bought up quickly and soon.

The next problem facing the government and the machine tool industry will be the pricing and sale of special purpose machines. The opinion here is that the "war reserve" of machine tools expected to be set up by the armed forces has proved to be such a vague promise of unknown quantities that little help from this is expected. Floods of shell lathes, barrel boring machines, rifling lathes and many other special purpose munitions tools are expected to be left over after any war reserve that the military may establish. In addition, there are hundreds of machines that are slightly altered, general purpose machines which are now special but are difficult to identify as special or general purpose. How can prices be established equitably on these is the question? The industry agrees that the price must be lower than for general purpose machines . . . but how much?

One authority states that many of the special purpose machines cannot be intelligently identified and separated. Also the question of orphan models poses a special problem. The answers to these questions are expected to come from Mr. Clayton soon. In the meantime, one observer suggests that a single price be set on all special and orphan machines. Instead of selling them this would have the effect of gathering the machines in warehouses because they wouldn't sell. This accomplished, cut prices could be established to move the machines.

•

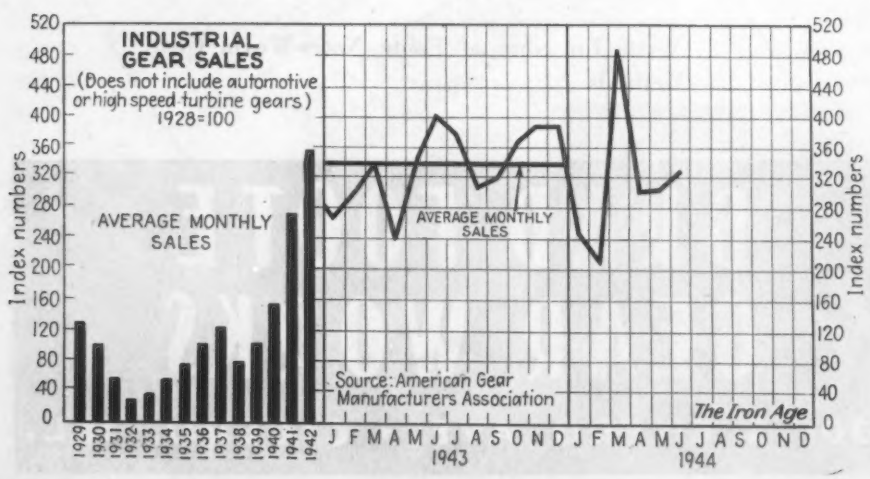
Cincinnati

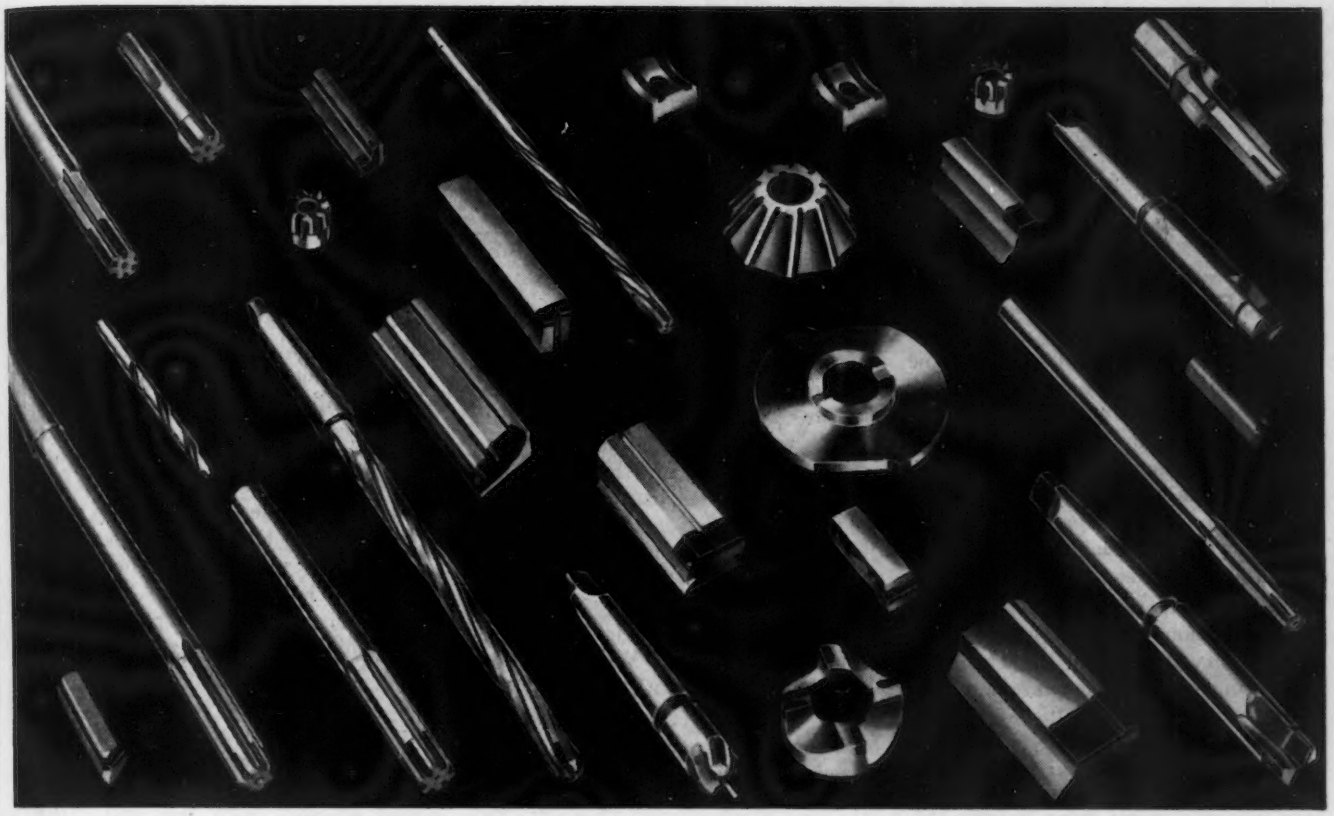
• • • **The general reaction** of machine tool manufacturers to the announcement of prices for the liquidation of government held machine tool stock was that the prices were by and large fair, although fear is expressed of the possibility of a mass unloading of these tools and the natural adverse effect upon the business. Machine tool men await the reaction of consumers to the government's announcement of the availability of these tools at prices that are better than the prices for surplus machinery at the conclusion of the last war.

Of course, comparison with the situation 25 years ago does not reflect a fair situation because of the greater number of tools available now as against the quantity available in 1919. While the reaction to the prices seem to be favorable, some comment on the fact that the government is going to unload these machine tools was definitely unfavorable. Some feeling was expressed that since the machine tool builders went all-out for the war effort and actually oversold the market for many years to come, there should have been a corresponding feeling of kindliness on the part of the government officials to the industry, at least to the extent of not permitting a dumping of this large quantity of tools now in government possession.

June Gear Sales Up 9 Per Cent

. . . The gearing industry as represented by the members of the American Gear Manufacturers Association shows an increase of 9 per cent in the business booked in June as compared with May. The June index figure was 328.





These Tools Are

Super Specials!

★

In addition to manufacturing all types of special carbide-tipped tools, Super Tool Company makes a complete line of Standard carbide-tipped bits, reamers, plain and side mills, shell end mills, face mills, end mills, counterbores, drills and centers.

★

DO you have any production jobs that require special cutting tools? If so, consult Super Tool Company. For Super Tool engineers have the engineering knowledge, the actual production experience and unexcelled plant and laboratory facilities to properly analyze your requirements and to design and build special carbide-tipped tools that will bring you maximum efficiency and money-saving economy.

Super Tool Company manufactures carbide-tipped tools exclusively—and has done so for many years. These years of experience, research, development and improvement are your assurance of complete satisfaction when you use carbide-tipped tools bearing the Super Tool Company name.

Whether your cutting job requires special or standard tools, whether you are cutting cast iron, steel or non-ferrous material, if you want speedy production, long tool life, extreme accuracy, fine finishes and real economy, try Super Carbide-Tipped Tools. You, too, will say they're "SUPER!"

SUPER TOOL COMPANY

Carbide Tipped Tools

21650 Hoover Rd., Detroit 13, Mich. 4105 San Fernando Rd., Glendale 4, Cal.

NON-FERROUS METALS

. . . News and Market Activities

Wide Use of Light Metals Delayed

• • • **Industry does not expect** to be in a position to take advantage of the recent relaxation of restrictions by WPB on aluminum and magnesium for at least the next several months. There are a number of factors that prevent immediate acceptance of this move toward eventual reconversion to civilian production.

Of chief importance is the present pre-occupation of industry with war production. Despite all the attention now being given to postwar planning, engineering and designing staffs are still devoting almost their entire personnel to problems of war importance. Civilian research and development has therefore been generally inadequate for immediate application of these metals. Production machinery and equipment, and the labor required for its operation, are occupied to capacity with war orders that are still being placed.

Moreover the orders extending the use of aluminum and magnesium require compliance with existent limitation orders and quotas established them. Such controls are retained in order to prevent immediate manpower diversion to the production of peacetime goods. Despite the fact that supplies of necessary items of hardware and kitchen appliances have been missing from stores for an extended period, immediate large scale resumption of civilian production is not to be expected.

Can manufacturers are experimenting with the use of aluminum to extend their production of containers to the dry products enumerated in the recent government authorization. However it is stated by a producer of aluminum that except for a number of special products, the relatively higher cost of aluminum than tin plate may prevent its competition for the bulk of the peacetime canning market.

•

Magnesium Production Cut Back

• • • **The WPB has ordered curtailment** of production of magnesium at four plants to the extent of 7.5 million lb. per month in order to bring surplus supplies of magnesium into line with stockpile objectives. Production of 3.6 million lb. of magnesium per month at the Dow Magnesium Corp. plant at Marysville, Mich., has been terminated by the order. Production of the Dow plant at Velasco, Tex., has been reduced by 600,000 lb. per month; Magnesium Reduction Corp., Lucky, Ohio, by 217,000 lb. per month; Electro Metallurgical Company, Spokane, Wash., by 1,100,000 lb. per month; and Basic Magnesium, Inc., Las Vegas, Nev., by 2 million lb. per month.

The plants affected are in or close to labor-short areas and workers released will be able to find employment in adjacent war plants. The Marysville, Michigan, shut-down was ordered because of manpower shortage, relatively high cost, transportation problems and critical coal consumption.

•

Cleveland

• • • **Fire swept the auxiliary plant** of the National Smelting Co. last week. Flames and blast destroyed buildings and magnesium of an estimated valuation of $150,000 to $500,000. The origin of the fire has not yet been disclosed.

•

Subsidize Zinc Smelters

• • • **Acting upon a recommendation** of Metals Reserve Co., WPB has announced that smelters treating Joplin zinc concentrates have been offered financial assistance to continue maximum production of zinc from concentrates originating in the Joplin, Mo., area. Contracts providing subsidy payments to such zinc smelters are now in effect. The base price of Joplin (Tri-state) concentrates f.o.b. mines or mills had been established at $55.28 per ton. Smelters found the margin between this figure and the 8¼ c. per pound price of prime western metal decreasing to the point where handling of Joplin concentrates became unprofitable, WPB said.

Smelters have shown a reluctance to treat maximum quantities of Tri-state concentrates for the last six months. This has resulted in government stock-piling of the concentrates and tonnages have been increasing steadily, WPB authorities pointed out. Payment of subsidies to smelters treating Tri-state concentrates should reduce the existing stockpile and permit smelters to keep abreast of current mine concentrate production from this area. Strategic importance is attached to the maximum treatment of these concentrates in order to recover their high cadmium content. The Joplin mine output is being maintained at its present rate by premium prices on zinc and lead concentrates under the Premium Price Plan for copper, lead and zinc.

Actual smelting costs have risen substantially during the last year and a half. Unavoidable increases in prices of coal, coke, gas and other supplies have contributed to the changing situation, and labor shortages are another important factor, members of the industry stated. The present stockpile of zinc appears adequate to meet the most adverse and unexpected circumstances, WPB said. However, the closing of any smelters at this time would endanger the war program.

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Expand Use of Light Metals

• • • **The WPB has recently authorized** the use of aluminum and magnesium for essential products and as substitutes for other metals and critical materials that are not so freely available. This policy implements recent decisions to provide for eventual reconversion to peacetime production while assuring full compliance with war demands.

In order M-1-i amended July 15 aluminum is made available for cans subject to packing quotas established by order M-81, for pots and pans subject to limitations imposed by the L-30 series, and rules relating to its use for closures have been liberalized. Aluminum and magnesium may also be substituted for any other metal provided there is no increase in a manufacturers's total production. Controls that have been retained over aluminum are chiefly to assure that manpower is not diverted to production of peacetime goods since immediate large scale resumption of civilian production is not to be expected.

REFINER, SMELTER PRICES

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, del'd	15.00
Aluminum, No. 12 Fdy., (No. 2)	12.00
Aluminum, deoxidizing grades	11.00 to 12.25
Antimony, Asiatic, New York	Nominal
Antimony, American, f.o.b. Laredo, Tex.	14.50
Arsenic, prime white, 99%	4.00
Brass, 85-5-5-5 ingots (No. 115)	13.00
Cadmium, del'd	90.00
Cobalt, 97-99% (dollars per lb.)	$2.11
Copper, electro, Conn. Valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Copper, beryllium, 3.75-4.25% Be; dollars per lb. contained Be	$15.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.5%, dollars per troy oz.	$7.50
Iridium, dollars per troy oz.	$165.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9+%, carlots	20.50
Magnesium, 12-in. sticks, carlots	30.00
Mercury, dollars per 76-lb. flask, f.o.b. New York	$103 to $105.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.37	....	20.87
Copper, H.R.	....	17.37	....
Copper, drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals; ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 24c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NON-FERROUS SCRAP METAL QUOTATIONS

(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums)

Copper, Copper Base Alloys

OPA Group 1

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25

OPA Group 3

Yellow brass soft sheet clippings	8.625
Yellow rod brass turnings	8.375
Zincy bronze borings	8.00
Zincy bronze solids	8.00
Fired rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]

OPA Group 4

Automobile radiators	7.00

OPA Group 5

Refinery brass	5.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.875
Loose Yellow Brass Trimmings	7.875

Aluminum

Plant scrap, segregated

All S-type alloys (except 2S)	8.50
2S solids	8.00
High grade alloys	7.00
Low grade alloys	6.50
Borings and turnings	
High grade alloys	5.50
Low grade alloys	5.00

Plant scrap, mixed

All solids	6.00
Borings and turnings	4.00

Obsolete scrap

Pure cable	8.00
Old sheet and utensils	7.00
Old castings and forgings	6.50
Pistons, free of struts	6.50
Pistons, with struts	4.50
Old alloy sheet	5.50

For old castings and forgings, pistons, sheets, add ½c. lb. for lots 1000 to 19,999 lb.; for other scrap add 1c.; for lots over 19,999 lb. add 1½c. a lb.

Magnesium

Segregated plant scrap

Pure solids and all other solids, exempt	
Boring and turnings	8.00

Mixed, contaminated plant scrap

Grade 1 solids	11.00
Grade 1 borings and turnings	7.00
Grade 2 solids	9.00
Grade 2 borings and turnings	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

New zinc clippings, trimmings	7.25
Engravers' lithographers plates	7.25
Old zinc scrap	5.75
Unsweated zinc dross	5.80
Die cast slab	5.80
New die cast scrap	4.95
Radiator grilles, old and new	4.95
Old die cast scrap	4.50

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead inc. cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size	22⅞
cut to size	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass: Cast, 82-20, elliptical, 15 in. and longer	23⅝
Zinc: Cast, 99.99, 16 in. and over.	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00–13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz., lots	40.82–41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 89% crystals, bbls.	6.80

SCRAP

. . . News and Market Activities

Trend Toward Firmer Market

• • • **While the market** for scrap iron and steel is spotty, the trend is toward a firmer market than recently. Throughout the country the market is slow for all grades, but it is apparent that there is a steady flow into mills. This could be a result of the recent general policy to restrict inventories, which may have caused them to have been reduced below suitable working levels. Labor conditions in dealers' yards has limited accumulation by dealers except for resale, and may have convinced buyers that unlimited supplies might not always be available.

Prices of heavy melting scrap are everywhere at ceilings. Turnings and borings, which have been selling generally, somewhat below ceilings, have gone back to ceiling levels in Buffalo this week. A serious break in the turnings market is expected to show up by sometime in September. Consumption of turnings is expected to decrease by this time and the output of turnings from the new heavy caliber shell program is expected to flood the market with hundreds of tons in excess of consumption. This of course hinges on the continuation of the war and of the shell contracts. The excessive supply anticipated is expected to toboggan the price.

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Washington

A number of additional exemptions from contract renegotiation, including iron scrap and steel scrap under certain circumstances, have been granted by the War Contracts Price Adjustment Board in revisions of the Renegotiation Regulations.

The iron scrap and steel scrap exemption, made under subsection (i) (4) (D) of the Renegotiation Act relating to standard commercial articles, applies only to dealers and brokers in iron scrap and steel scrap, the regulations explain, and is not to be construed as affecting users of such scrap, manufacturers of iron or steel or processors making iron or steel products who may produce and sell such scrap as a by-product in the course of their operations. Neither does the exemption cover dealers in second-hand iron and steel machinery, equipment or facilities that are sold for reuse in any way other than as scrap.

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PITTSBURGH—This market has become quite selective insofar as buying of scrap is concerned. Consumers are beginning to smell the end of the war and feel that buying now for perhaps September or October consumption might mean buying for consumption after the close of the war in Europe. Consequently, some mills have gone out of the market activity continues to hamper about how much scrap is being shipped in. There have been no weak spots pricewise, except some minor restrictions involving freight rates on certain grades, but the current weakness in the market might well forewarn of the coming of selective pricing, with scrap selling at market rather than ceiling prices.

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CHICAGO—Increased caution in mill buying is noted in some quarters as a result of more favorable war news. However, heavy melting steel continues to find a ready market. Although lack of market activity continues to hamper establishment of a firm price on short shoveling turnings, minor transactions not directly involving the Chicago market continue to indicate a stronger tone than reflected by the usual discount of two dollars below ceiling.

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BOSTON — Allocated heavy melting steel is moving to Buffalo in small lots. Lack of labor to prepare material is a check on shipments. Regular turnings and blast furnace material to Pennsylvania, and low phos plate scrap, stove plate and cast iron to New England points are moving in modest quantities, all at ceiling prices. Notification by mills they are ready to cancel contracts when time limits expire has been received by the trade. The 3000-ton low phos purchase by a New England consumer is expected to clean up within a week.

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NEW YORK—Heavy melting scrap is moving steadily from this area to Sparrows Point, Bethlehem and Lackawanna. Blast furnace grades are moving at ceiling prices delivered, which represents a minor reduction from actual ceiling prices. Low phos is being sold in eastern Pennsylvania at a sacrifice to local yards since the springboard is not being paid.

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PHILADELPHIA—At present there is only one mill in this district that is out of the market for open hearth grades. All others have come back within the last week. Dealers are now able to move all grades but low phos which continues to be a problem. There has been no break in prices except in the case of turnings and low phos where less than ceiling prices have been in effect for some time.

BUFFALO—Heavy sales of steel turnings at the ceiling price of $14.25 are reported after weeks of light deliveries at $13. The sudden return to the code level is believed due to the inability of the district's heaviest buyer to load up at the lower figure. Dealings appear to be brisk in all items at OPA prices. German war scrap, mostly armored cars and light tanks, scheduled for prompt delivery to local yards for processing, will amount to about 1500 tons, it is estimated.

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CLEVELAND — The market here is still very dull, but small offerings are being moved. Most shipments are going to the Valley with almost nothing being accepted locally. The turnings market in the city is slowed perceptibly by the temporary exit of a leading consumer. Scrap is reported coming out fast enough to satisfy the poor demands of the mills despite the fact that yards are not very actively seeking new stocks. Inventories in general are being allowed to drop.

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DETROIT — Scrap is moving more slowly here. Demand from the mills is generally thin, and declining yard activity is indicated by the fact that the lessened requirements have not built appreciable inventories among dealers. Open hearth grades are selling with less difficulty than others. Cast scrap, hitherto much in demand, is still being taken, but gives indication of slowing down a bit. With the largest local consumer of blast furnace grades out of the market, borings and turnings are moving out of Detroit, in some cases at slightly lower prices than ceiling. Electric furnace scrap is especially stagnant. Dealers here blame the mushy demand on mill desires to avoid being caught with substantial inventories when European war ends and steel demand drops. Most opinion does not anticipate important change in market conditions, but some point out that if the war continues without change into September, the mills will have to begin thinking about stockpiling at least a fair amount of scrap against the winter months.

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ST. LOUIS — Steel mills in the St. Louis industrial district are holding their inventories to their present 20 to 40 days supply, and are buying sparingly, declining scrap iron from distant points with its extra freight charges. This is the first time in several years that the mills have declined to take in all the scrap they could get.

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BIRMINGHAM — Scrap shipments in this area are limited, purchases are few and prices are down. Open hearth No. 2 bundles are being delivered at $1 under the ceiling with no freight springboard allowance permitted. There have been sales of foundry grades at from $1 to $2 under ceiling prices, but there are no offers at present for cast grades. Blast furnace grades are in demand, but purchases are under ceilings.

Prices of Iron and Steel (Other Than Railroad) Scrap, Per Gross Ton

	BASIC OPEN HEARTH AND BLAST FURNACE GRADES							ELECTRIC FURNACE, ACID OPEN HEARTH, AND FOUNDRY GRADES										
								Low Phos.		Heavy Structural and Plate			Foundry Steel					
	No. 1 & 2 Heavy Melt. Steel; No. 1 Bushel; No. 1&2 Bdles.; Bundled Mach. Shop. Turn.	No. 3 Bundles	No. 2 Busheling	Shoveling Turnings	Cast Iron Borings	Machine Shop Turnings; Mixed Borings and Turnings	Mill Scale	Billet, Bloom and Forge Crops	Bar Crops, Plate Scrap; Cast Steel; Punchings and Plate Scrap	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Springs and Crankshafts	Alloy Free Turnings	Heavy Turnings	Briquetted Cast Iron Borings	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$18.00	$17.50	$17.00	$16.00	$15.00	$12.00	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$20.00	$21.00
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	19.50	17.50	17.00	16.50	15.50	14.50	11.50	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	19.50	20.50
Buffalo	19.25	17.25	16.75	16.25	15.25	14.25	11.25	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	19.25	20.25
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	16.75	16.25	15.75	14.75	13.75	10.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	18.75	19.75
Bethlehem; Kokomo, Ind.	18.25	16.25	15.75	15.25	14.25	13.25	10.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	18.25	19.25
Duluth	18.00	16.00	15.50	15.00	14.00	13.00	10.00	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	18.00	19.00
Detroit	17.85	15.85	15.35	14.85	13.85	12.85	9.85	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	17.85	18.85
Toledo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis	17.50	15.50	15.00	14.50	13.50	12.50	9.50	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	17.50	18.50
Birmingham, Atlanta, Alabama City, (Ala.), Los Angeles, Pittsburg (Cal.), San Francisco	17.00	15.00	14.50	14.00	13.00	12.00	9.00	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	17.00	18.00
Minnequa, Colo.	16.50	14.50	14.00	13.50	12.50	11.50	8.50	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	16.50	17.50
Seattle, Wash.	14.50	12.50	12.00	11.50	10.50	9.50	6.50	19.50	17.00	16.00	16.50	17.00	16.00	16.50	15.50	12.50	14.00	14.50	15.50

SPECIAL GRADES: Briquetted Turnings up to 20 lb. with a density of not less than 60 per cent sell at the same price as Bundled Machine Shop Turnings. No. 1 and 2 Chemical Borings have a ceiling price of $1 and $2, respectively, less than No. 1 Heavy Melting Steel when sold for use for chemical or annealing purposes. Otherwise, the price shall not exceed that of cast iron borings. Sellers may charge additional 75c. for loading in box cars or gondolas with weatherproof covering. Tin Can Bundles are $4 less than No. 2 Bundles. Welding Rod Butts are $3.50 per ton less than No. 1 Heavy Melting Steel. Wrought Iron is $6.50 per ton more than No. 1 Heavy Melting, when sold to a producer of wrought iron. Otherwise, maximum shall not exceed prices for corresponding basic open hearth or blast furnace grade. Shafting is $7.00 per ton higher than No. 1 Heavy Melting. This includes random length shafting suitable without further preparation for rerolling or forging.

Price of Pit Scrap, ladle scrap, salamander scrap, skulls, skimmings, or scrap recovered from slag dumps and prepared to charging box size shall be computed by deducting from No. 1 Heavy Melting Steel Scrap prices the following amounts: Fe content, 85 per cent and over, $2; 75 per cent and over, $4; less than 75 per cent, $8.

Grindings or mill cinders (except cast iron grindings with Fe content 85 per cent and over when sold for chemical use) shall be $4 per ton at any shipping point.

MAXIMUM SHIPPING POINT PRICE: Where shipment is wholly or partially by rail or vessel, or combination of rail and vessel, the scrap is at shipping point when placed f.o.b. railroad or f.a.s. vessel. For motor vehicle shipments scrap is at shipping point when loaded. Then maximum shipping point price shall be: (a) For shipping point located within a basing point, prices shown in above table for scrap at basing point in which shipping point is located, minus applicable switching charge deduction shown in paragraph labeled **Switching Charges.** (b) For shipping points outside basing point, price listed in above table for scrap at most favorable basing point, minus lowest charge for transportation from shipping point to such basing point by rail or water carrier or combination. When vessel movement is involved, in lieu of established dock charge or any cost customarily incurred at the dock, 75c. per ton must be included as part of deduction in computing shipping point price; 50c. at Memphis; $1 at Great Lakes ports; and $1.25 at New England ports. If no established transportation rate exists for a portion of movement from shipping to basing point, actual charge or cost customarily incurred by shipper in such portion of movement shall be included as part of deduction in computing shipping point price. For exceptions see official order.

SWITCHING CHARGES: Deductions to determine the maximum shipping point prices for scrap originating in basing points are as follows (cents per gross ton): Chicago, 84c.; Pittsburgh, Brackenridge, 55c.; Detroit, 53c.; Cleveland, Johnstown, Sharon, Warren, Weirton, Youngstown, Midland, Los Angeles, San Francisco, Pittsburg (Cal.), 42c.; Seattle, 38c.; Buffalo, Claymont, 36c.; Atlanta, Birmingham, 32c.; Ashland, Bethlehem, Butler, Canton, Cincinnati*, Coatesville, Duluth, Harrisburg, Kokomo, Monessen, Phoenixville, Portsmouth, St. Louis, Steubenville, 28c.; Alabama City, 26c.; Minnequa, 22c.; Middletown, 14c.; Conshohocken, Sparrows Point, 11c.

*For basic open hearth, blast furnace, and foundry grades, the switching charge deduction shall be 80c. per gross ton.

UNPREPARED SCRAP: For unprepared scrap except bundle scrap, maximum prices shall be $3.50 per gross ton less than price of No. 1 heavy melting. That unprepared which when compressed constitutes a No. 1, 2, or 3 bundles shall be $4.00 less than price for those prepared grades. Unprepared from which Tin Can Bundles is constituted shall be $3.50 less than that prepared grade. Preparation-in-transit charges for such work are provided for in the order. Maximum fees for in-transit preparation of scrap that is allocated to a consumer by WPB are shown in the order, as well as exceptions.

ALLOY CONTENT: Premiums are allowed for specific alloy contents for the following alloys: Nickel—$1 for each 0.25 per cent for 1 to 5.25 per cent ni.; Molybdenum—$2 for not less than 0.15 per cent and $3 for not less than 0.65 per cent mo.; Manganese—$3 over No. 1 heavy melting steel price for not less than 10 per cent if scrap is in sizes larger than 12x24x8-in. $7 over No. 1 price when not less than 10 per cent mn. and cut to sizes of 12x48x8-in. or smaller. These mn. premiums applicable only if scrap is sold for electric furnace use. Chromium—$1 if scrap conforms to SAE 52100 and sold for electric furnace use. Multiple Alloys—Where scrap contains two premium alloys, premium charged may not exceed maximum premium for any one contained alloy.

Tool Steel Scrap Prices (MPR 379)

SEGREGATED	Solids Per Lb. Cont. W	Turnings Per Lb. Cont. W
Type 1. 12% min. W, 1% max. Mo	$1.80	$1.60
Type 2. 5 to 12% W, 1% max. Mo	1.60	1.40
Type 3. 1 to 5% W, 1.5% max. Mo	1.25	1.25
*Type 4. 7% min. Mo, 2½% max. W	0.125	0.105
*Type 5. 3.5 to 6% Mo, 4.5 to 6% W	0.135	0.115

*Per lb. of scrap material.

UNSEGREGATED SOLIDS

$1.50 per lb. contained W if 5% or more.
$1.15 per lb. contained W if 1 to 5%.
$0.80 per lb. contained Mo if 1.5% or more.

UNSEGREGATED TURNINGS

$1.30 per lb. contained W if 5% or more.
$1.00 per lb. contained W if 1 to 5%.
$0.70 per lb. contained Mo if 1.5% or more.

If both W and Mo are within ranges, payment may be made for both W and Mo content.

If segregated, a premium of $1.50 per lb. of contained Co allowed if Co content is 3% or over. No scrap considered segregated if Co content ranges between 0.5 and 3%. If Cu or Ni content over 0.25%, price shall be reduced by 50%. If 500 lb. or less is sold, either segregated or unsegregated, price shall be reduced 2c. per lb. of scrap material.

Cast Iron Scrap Price, Per Gross Ton

The maximum shipping point, or on-line price in the case of railroad sellers, price per gross ton for cast iron scrap shall be the price shown in the accompanying table for the zone in which the scrap is located. For railroad sellers the maximum on-line price shall be the price shown in the table for the highest priced zone in which the railroad operates.

Grades	Zone A	Zone B	Zone C
Cast Iron No. 1 (cupola cast)	$18.00	$19.00	$20.00
Cast Iron No. 2 (charging box cast)	17.00	18.00	19.00
Cast Iron No. 3 (heavy breakable cast)	14.50	15.50	16.50
Cast Iron No. 4 (burnt cast)	13.25	14.25	15.25
Cast Iron Brake Shoes	13.25	14.25	15.25
Stove Plate	17.00	18.00	19.00
Clean Auto Cast	18.00	19.00	20.00
Unstripped Motor Blocks	15.50	16.50	17.50
Wheels No. 1	18.00	19.00	20.00
Malleable	20.00	21.00	22.00

Zone A includes Mont., Idaho, Wyo., Nev., Utah, Ariz., and N. M. Zone B includes N. D., S. D., Neb., Colo., Kan., Okla., Texas, and Fla. Zone C includes all states not named in zones A and B, and includes switching district of Kansas City, Kansas-Missouri.

DELIVERED PRICE: For any cast grade, the delivered price shall be the shipping point price plus established charges for transportation from shipping point to point of delivery by means of transportation employed. If delivery involves water movement, dock charges incurred may be added. On privately owned docks, specified charges are listed in the order. For scrap of railroad origin, the delivered price shall be the maximum on-line price plus transportation charges allowable to railroad sellers of steel scrap. For truck deliveries, shipping point or on-line prices plus established public carrier charges, except when truck is shipper-owned, shall determine price. When truck is shipper or broker-owned, price is that shown in table plus the highest established rail carload freight rate for shipping scrap from rail siding nearest shipping point to rail siding nearest point of delivery. Springboard limitations shall be applicable to truck deliveries of all non-operating railroad or dealer and industrial scrap. Where truck delivery charges in excess of $1 occur, they must be certified by OPA.

Comparison of Prices . . .

Advances Over Past Week in Heavy Type; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	Aug 1, 1944	July 25, 1944	June 27, 1944	Aug. 3, 1943
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs, rerolling	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Aug 1, 1944	July 25, 1944	June 27, 1944	Aug. 3, 1943
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.84	$25.89
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	25.11	25.11	25.11	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	31.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.00	$7.00	$7.00	$6.50
Foundry coke, prompt	8.25	8.25	8.25	7.50
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 147-157.

Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
August 1, 1944	2.25513c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton

	HIGH	LOW	HIGH	LOW	HIGH	LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 8
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

. . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per lb. under base; primes 25c. above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price for annealed, bright finish wires, commercial spring wire.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Provo, Utah	10 Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
Hot Rolled Sheets	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢			2.65¢	2.20¢	2.34¢	2.27¢
Cold Rolled Sheets[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢			3.70¢	3.15¢	3.39¢	3.37¢
Galv. Sheets (24 gage)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢			4.05¢		3.74¢	3.67¢
Enameling Sheets (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢			4.00¢	3.45¢	3.71¢	3.67¢
Long Ternes[2]	3.80¢	3.80¢	3.80¢										4.55¢		4.16¢	4.12¢
Hot Rolled Strip[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢			2.75¢	2.20¢	2.46¢	
Cold Rolled Strip[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)						2.90¢	3.16¢	
Cooperage Stock Strip	2.20¢	2.20¢			2.20¢		2.20¢								2.56¢	
Commodity C-R Strip	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester = 3.35¢)						3.05¢	3.31¢	
Coke Tin Plate, Base Box	$5.00	$5.00	$5.00						$5.10						5.36¢	5.32¢
.50 } Electro Tin Plate, Box	$4.50	$4.50	$4.50						$4.60							
.75 } Electro Tin Plate, Box	$4.65		$4.65						$4.75							
Black Plate (29 gage)[5]	3.05¢	3.05¢	3.05¢						3.15¢				4.05¢[12]			3.37¢
Mfg. Ternes, Special Box	$4.30	$4.30	$4.30						$4.40							
Carbon Steel Bars	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢		2.80¢	2.25¢	2.49¢	2.47¢
Rail Steel Bars[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢		2.80¢			
Reinforcing (Billet) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢		2.55¢[13]	2.25¢	2.39¢	
Reinforcing (Rail) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢		c2.55¢[13]	2.25¢		2.47¢
Cold Finished Bars[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢		(Detroit = 2.70¢)			(Toledo = 2.80¢)				2.99¢	2.97¢
Alloy Bars, Hot Rolled	2.70¢	2.70¢				2.70¢	(Bethlehem, Massillon, Canton = 2.70¢)							2.80¢		
Alloy Bars, Cold Drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢								3.45¢		
Carbon Steel Plates	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	(Coatesville and Claymont = 2.10¢) 2.10¢	2.35¢		2.45¢	2.60¢	2.65¢	2.32¢	2.29¢	2.15¢
Floor Plates	3.35¢	3.35¢									3.70¢		4.00¢		3.71¢	3.67¢
Alloy Plates	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95		4.15¢		3.70¢	3.59¢
Structural Shapes	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.45¢		2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R 0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)									
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)									
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)									
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)									
Bright Wire[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)		(Duluth = 2.65¢)				3.10¢			2.92¢
Galvanized Wire	Add proper size extra and galvanizing extra to Bright Wire base.															
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)						3.70¢			3.52¢
Steel Sheet Piling	2.40¢	2.40¢				2.40¢							2.95¢			2.72¢

EXCEPTIONS TO PRICE SCHED. NO. 6

Slabs—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. $34 Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel $47.50.

Blooms—Phoenix Iron Co. (rerolling) $41, (forging) $47; Pgh. Steel Co. (reroll) $38.25, (forging) $44.25.

Sheet Bar—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto; Phoenix Iron Co. $47.00 mill. Geneva Steel Co. $64.64 f.o.b. Pacific Coast; Pittsburgh Steel Co. $49.50.

Billets, Rerolling—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. (small) $36 Portsmouth, Ohio; (blooming mill sizes) applicable base, f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.69 Birmingham; Ford Motor Co. $34 Dearborn, Mich. Geneva Steel Co. $58.64 f.o.b. Pac. C. Pgh. Steel Co. $43.50.

Structural Shapes—Phoenix Iron Co. $2.35 basing pts. (export) $2.50 Phoenixville; Knoxville Iron Co. $2.30 basing points.

Bar Size Shapes—(Angles) W. Ames & Co., 10 tons or over, $3.10 mill.

Rails—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp., $45 Pueblo.

Hot Rolled Plate—Granite City Steel Co. $2.65 mill; Knoxville Iron Co. $2.25 basing pts.; Kaiser Co. and Geneva Steel Co. $3.20 Pacific Ports; Central Iron & Steel Co. $2.50 basing points; Granite City Steel Co. $2.35 Granite City.

Merchant Bars—W. Ames Co., 10 tons and over, $2.85 mill; Eckels-Nye Steel Corp., $2.50 basing pts. (rail steel) $2.40; Phoenix Iron Co. $2.40 basing pts.; Sweet Steel Co. (rail steel) $2.35 mill; Joslyn Mfg. & Supply Co., $2.35 Chicago; Calumet Steel Div., Borg Warner Corp. (8 in. mill bars) $2.35 Chicago; Knoxville Iron Co. $2.30 basing pts. Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill. Milton Mfg. Co. $2.75 f.o.b. Milton, Pa.

Logan Iron and Steel Co., Burnham, Pa., wrought iron bars, Grade I, $7.90 per 100 lb. f.o.b. plant. Ceiling is $7.40 per 100 lb.

Reinforcing Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Sweet Steel Co. (rail steel) $2.35 mill; Columbia Steel Co. $2.50 Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Massfield, Mass., f.o.b. Massfield; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight ville; Medart Co. in certain areas, Chi- Buffalo to Readville, Mass. f.o.b. Readcago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co. for delivery except Texas and Okla. Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co. shipped outside Ala., Mississippi, Louisiana. Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co. $2.30 Chicago; Knoxville Iron Co. $2.25 basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel Co., $2.25 Parkersburg.

Galvanized Sheets—Andrews Steel Co., $3.75 basing pts.; Parkersburg Iron & Steel Co. $3.85 Parkersburg; Apollo Steel Co. $3.75 basing pts.; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

Black Sheets—Empire Sheet and Tinplate Co., maximum base price mill is $2.45 per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendments to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
**Philadelphia	3.518	4.872[8]	5.018[a]	3.922	4.772	3.605	3.668	3.822	4.072	5.966	7.068	7.272	8.322
New York	3.590	4.813[3]	5.010	3.974[6]	4.772	3.768	3.758	3.853	4.103	6.008	7.108	7.303	8.353
Boston	3.744	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.262	7.344	8.394
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
Chicago	3.25	4.20	5.231	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.85	6.85	7.90
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.087	7.087	8.137
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.056	6.85	7.90
Buffalo	3.35	4.40	4.75[4]	3.819	4.689	3.63	3.40	3.35	3.75	5.75	6.85	6.85	7.90
Detroit	3.45	4.50	5.00[4]	3.70	4.65[917]	3.609	3.661	3.45	3.80	6.08	7.18	7.159	8.209
Cincinnati	3.425	4.475[3]	4.825[3]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.347[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.231	7.231	8.281
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	6.85	6.85	7.90
St. Paul	3.51	4.46	5.257[4]	3.86	4.35[17]	3.81[13]	3.81[13]	3.76[13]	4.361	6.09	7.19	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.43	....	....	....	....
Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	6.08	7.18	7.18	8.23
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.965[7]	4.66	3.265	4.215	....	4.065	4.065	4.015	4.33	....	....	....	....
New Orleans	4.058*	4.95	5.358	4.308	....	4.158	4.158*	4.108*	4.629	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25*	3.75	6.373[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20[3]	6.10[4]	4.95	5.613[18]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.50[14]	7.33[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	6.60[4]	5.75[4]	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.53[17]	....	6.17[18]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

NATIONAL EMERGENCY (N. E.) STEELS

(Hot Rolled Mill Extras for Alloy Content)

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar-Strip	Billets, Blooms and Slabs	Bars and Bar-Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35				.10c	$2.00		
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.65	13.00	1.26c	$25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.65	13.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.65	13.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.65	13.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.65	13.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.65	13.00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.65	13.00	1.25	25.00
NE 8640	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.65	13.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.65	13.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.65	13.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.65	13.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.20/ .30	.70	14.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20				.40	8.00		
NE 9260	.55/ .65	.70/1.00	.040	.040	1.80/2.20				.40	8.00		
NE 9261	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.10/ .25			.65	13.00		
NE 9262	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.25/ .40			.65	13.00		
NE 9415	.13/ .18	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9425	.23/ .28	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9545*	.43/ .48	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00

*Recommended for large sections only. Note: The extras shown are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.

Base Quantities

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1499 lb.; strip, extras on all quantities; bars, 1500 lb base; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb. and over. (15) 1000 lb. and over. (16) 1500 lb. and over. (17) 2000 lb. and over. (18) 3500 lb. and over.

(a) **Philadelphia:** Galvanized sheets, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271c. for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports)**

Per Gross Ton

Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

SEMI-FINISHED STEEL

Ingots, Carbon, Rerolling

Base per gross ton, f.o.b. mill.... $31.00
Exceptions: Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast Ports; Empire Sheet & Tinplate Co., $34.25. Pgh. Steel Co. $33.10.

Ingots, Carbon, Forging

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00
Exceptions: Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports. Pgh. Steel Co. $38.10.

Ingots, Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh $45.00
Exceptions: C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Provo, $11.20 higher. Delivered prices do not reflect three per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Billets, Blooms, Slabs

Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton 54.00
Price delivered Detroit $2.00 higher; E. Michigan $3.00 higher.

Shell Steel

	Per Gross Ton
3 in. to 12 in....	$52.00
12 in. to 18 in.....	54.00
18 in. and over.....	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.
Prices delivered Detroit are $2.00 higher; E. Michigan, $3 higher.
Price Exception: Follansbee Steel Corp. permitted to sell at $13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of $52.00.
Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared ..	1.90c.

Wire Rods

(*No. 5 to 9/32 in.*)

	Per Lb.
Pittsburgh, Chicago, Cleveland ..	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(*F.o.b. Pittsburgh, Bethlehem, Syracuse*)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

PRICES

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200.00 per Net Ton

	Black	Galv.
Steel (Butt Weld)		
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
½ in.	24	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18
Steel (Lap Weld)		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron (Same as Above)		
½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago.... $54.80
6-in. and larger, del'd New York... 52.20
6-in. and larger, Birmingham 46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles 69.40
6-in. and larger f.o.b. cars, Seattle. 71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	Hot Rolled	Lap Weld, Hot Rolled
2 in. o.d. 13 B.W.G.	15.03	13.04	12.39
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft., and over..... Base
30,000 lb. or ft. to 39,999 lb. or ft. 5%
20,000 lb. or ft. to 29,999 lb. or ft. 10%
10,000 lb. or ft. to 19,999 lb. or ft. 20%
5,000 lb. or ft. to 9,999 lb. or ft. 30%
2,000 lb. or ft. to 4,999 lb. or ft. 45%
Under 2,000 lb. or ft..... 65%

PRICES

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	Pacific Coast Basing Points†
	Base per Keg	
Standard wire nails	$2.55	$3.05
Coated nails	2.55	3.05
Cut nails, carloads	3.85	....
	Base per 100 Lb	
Annealed fence wire	$3.05	$3.55
Annealed galv. fence wire	3.40	3.90
	Base Column	
Woven wire fence*	$0.67	$0.85
Fence posts, carloads	.69	.86
Single loop bale ties	59	.84
Galvanized barbed wire**	.70	.80
Twisted barbless wire	.70	....

*15½ gage and heavier. **On 80-rod spools in carload quantities.
†Prices subject to switching or transportation charges.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

Base discount less case lots

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 in. to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 per cent additional discount.

Stove Bolts	*Consumer*
Packages, nuts loose	.71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets
(½ in. and larger)

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets
(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws	*Consumer Per Cent Off List*
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston	*$25.50*	*$25.00*	*$26.50*	*$26.00*	.....	.....
Brooklyn	*27.50*	*27.00*	.....	*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia (4)	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	.....
Bethlehem, Pa.	25.00	24.50	26.00	25.50	.....	.....
Everett, Mass.	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50	.....
Birdsboro, Pa. (3)	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa. (1)	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati, Ohio	*25.11*	*24.61*	.....	*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	*35.46*	.....*$37.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	*32.42*	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown	24.00	23.50	24.50	24.00	*32.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	34.00
Lyles, Tenn. fc. (2)	.....	.....	.....	.....	.....	33.00
St. Paul	*26.63*	26.13	*27.13*	*26.63*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

(1) Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable. Struthers Iron and Steel Co. may add another $1.00 per gross ton for iron from Struthers, Ohio, plant.

(2) Price shown is for low-phosphorous iron; high phosphorous sells for $28.50 at the furnace.

(3) E. & G. Brooke Co. Birdsboro, Pa., permitted to charge $1.00 per ton extra.

(4) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 to 2.25 per cent); Phosphorus differentials, a reduction of 38c. per ton for phosphorus content of 0.70 per cent and over; Manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, c. per lb., ton lots.

Copper, electrolytic, 150 and 200 mesh	21⅛ to 23½c
Copper, reduced, 150 and 200 mesh	20½ to 25½c
Iron, commercial, 100 and 200 mesh, 96 + % Fe	13½ to 15c
Iron, crushed, 200 mesh and finer, 90 + % Fe	4c
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe	63c
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe	30 to 33c
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42c
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90c
Aluminum, 100 and 200 mesh	*23 to 27c
Antimony, 100 mesh	20.6c
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.03
Lead, 100, 200 & 300 mesh, 11½ to 12½c	
Manganese, 150 mesh	51c
Nickel, 150 mesh	51½c
Solder powder, 100 mesh, 8½c. plus metal	
Tin, 100 mesh	58¾c
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Molybdenum power, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00

*Freight allowed east of Mississippi.

COKE

Furnace, beehive (f.o.b. oven)	Net Ton
Connellsville, Pa.	$7.00*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	8.25
Foundry, By-Product	
Chicago, del'd	13.35
Chicago, f.o.b.	12.60
New England, del'd	14.25
Kearny, N. J., f.o.b.	12.65
Philadelphia, del'd	12.88
Buffalo, del'd	13.00
Portsmouth, Ohio, f.o.b.	11.10
Painesville, Ohio, f.o.b.	11.75
Erie, del'd	12.75
Cleveland, del'd	12.80
Cincinnati, del'd	12.85
St. Louis, del'd	13.85
Birmingham, del'd	10.50

*Hand drawn ovens using trucked coal permitted to charge $7.75 per ton plus transportation charges. **Mo., Ala., and Tenn. producers—$13.35.

PRICES

REFRACTORIES
(F.o.b. Works)

Fire Clay Brick	***Per 1000***
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60
Silica Brick	
Pennsylvania and Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00
Chrome Brick	***Per Net Ton***
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00
Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00
Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

RAILS, TRACK SUPPLIES
(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$40.00
Angle splice bars, 100 lb.	2.70
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00
	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

CORROSION AND HEAT-RESISTING STEEL
(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

ELECTRICAL SHEETS
(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

PRICES

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Bethlehem, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Carload lots (packed)	141.00
Less ton lots (packed)	148.50

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	36c.
L.c.l. lots	38c.

95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.

Carload, bulk	34c.
L.c.l. lots	35c.

Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% Si	6.65c.	7.10c.	7.25c.
75% Si	8.05c.	8.20c.	8.75c.
80-90% Si	8.90c.	9.05c.	9.55c.
90-95% Si	11.05c.	11.20c.	11.65c.

Spot sales add: .45c. per lb. for 50% Si, .3c. per lb. or 75% Si .25c. per lb for 80-90% and 90-95% Si.

Silvery Iron

(Per Gross Ton, base 6.00 to 6.50 Si)

F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphoros or over.

*OPA price established 6-24-41.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	3.35c.	3.50c.	3.65c.
2000 lb.-carload	3.8c.	4.2c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05c.
2000 lb. to carload	6.70c.
Under 2000 lb.	6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.
2000 lb. to carload	6.30c.
Less ton lots	6.55c.

Ferrochrome

(65-72% Cr, 2% max. Si)

OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C	23.00c.	23.40c.	24.00c.
0.10% C	22.50c.	22.90c.	23.50c.
0.15% C	22.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr, 4-10% C	13.00c.	13.40c.	14.00c.

Other Ferroalloys

Ferrotungsten, Standard grade, lump or ¼X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten, 10,000 lb. or more... $1.90

Ferrovanadium, 35-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per usual freight allowances, per lb. contained Va.
- Open Hearth $2.70
- Crucible $2.80
- Primos $2.90

Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal $1.50

Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5. Spot sales add 5c. per lb. contained V_2O_5 ..... $1.10

Ferroboron, contract basis, 17.50% min. Bo, f.o.b. producer's plant with usual freight allowances, per lb. of alloy.
- 2000 lb. to carload $1.20
- Under 2000 lb. 1.30

Silicaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)
- Carload lots ..... 25c.
- 2000 lb. to carload ..... 26c.

Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)
- Carload lots ..... 58c.
- 2000 lb. to carload ..... 59c.

Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis
- No. 1 ..... 87.5c.
- No. 6 ..... 60c.
- No. 79 ..... 45c.

Bortram, f.o.b. Niagara Falls
- Ton lots, per lb. ..... 45c.
- Less ton lots, per lb. ..... 50c.

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb. contained Cb.
- 2000 lb. lots $2.25
- Under 2000 lb. lots $2.30

Ferrotitanium, 40%-45%, f.o.b. 0.10c. max. Niagara Falls, N. Y., ton lots, per lb. contained Ti.. $1.23
- Less ton lots $1.25

Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium $1.35
- Less ton lots $1.40

High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per carload $142.50

Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton $58.50

Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton $75.00

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per lb. contained Mo. 95c.

Calcium molybdate, 40%-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo ..... 80c.

Molybdenum oxide briquetes, 48%-52% Mo, f.o.b. Yangeloth, Pa., per lb. contained Mo ..... 80c.

Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo ..... 80c.

Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add ¼c. for spot sales
- Carload lots ..... 14c.

Zirconium, 12-15%, contract basis, lump, f.o.b. plant usual freight allowances, per lb. of alloy
- Carload, bulk ..... 4.6c.

Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk ..... 5.75c.
- Ton lots ..... 7.25c.

Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.
- Car lots ..... 8.75c.
- Ton lots ..... 9.25c.

*Extreme

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